FLIGHT and AIRCRAFT ENGINEER

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The Outlook

Conscription and the R.A.F.

WITH the unedifying spectacle of the Government's scuttle on conscription (or compulsory service as the modern euphemism has it) we have no concern, but the effect on the efficiency of the Royal Air Force of reducing the period of service from 18 months to 12 is very much our concern.

It is now a great many years since the "Father of the R.A.F.," Viscount Trenchard, delivered the dictum that a small, well-equipped and highly trained air force will cut through one greater in number but less efficient "like a knife through hot butter." Quite recently Sir Arthur Coningham expressed the same view in different terms by saying that henceforth quality, not quantity, must be our aim.

Under the conscription scheme the Royal Air Force will probably get sufficient numbers (on paper), but of what use will a man be whose term of service is only one year? Quite obviously it will be hopeless to train him in any of the more technical trades, and he will perforce be confined to doing all the drudgery on a station once his initial recruit training is over. Unless, therefore, volunteers come forward in sufficient numbers (and so far there are few indications that this will be the case), the R.A.F. is likely to be in a sorry plight in the matter of maintenance of aircraft and engines, to mention but one aspect upon which the effectiveness of an air force so largely depends.

It is no manner of use equipping the R.A.F. with all the latest flying equipment if this cannot be kept up to concert pitch, and obviously it will be almost impossible to do this under the scheme contemplated. The aim of the Royal Air Force must be, as Sir Arthur Coningham said, highly efficient units organized as cadres and capable of expansion. Anything less calculated to achieve this than the proposed one-year service for ground crew personnel it would be difficult to imagine.

Lord Kemsley's Munificence

THERE is an old saying that a little help is worth more than a lot of sympathy. Lord Kemsley, by his magnificent support for private flying, is giving more than a little help to a branch of aviation which has been languishing since the war, and, to continue the simile, his very practical gesture is worth all the official expressions of good will ever made.

By his generosity in establishing a £100,000 fund from which a committee of the Royal Aero Club will be able to arrange loans, Lord Kemsley has created the possibility of keeping alive the light plane and glider clubs which were in danger of extinction due to the relatively high cost of unsubsidized flying, a danger which is made all the greater by the new regulations now being considered by the Ministry of Civil Aviation. These, if they come into force, will make it a very expensive hobby for any private individual to obtain enough flying experience to be allowed to take his aircraft on lengthy cross-country flights, apart from the fact that aircraft of the private-owner type are necessarily expensive because of present circumstances and the small demand.

The Minister of Civil Aviation, in thanking Lord Kemsley for his magnificent contribution, has expressed his intention to encourage private flying and to get from the committee presided over by Mr. Whitney Straight the very best recommendations possible. It is to be hoped that these will include not only reasonable liberty for the pilots of small aircraft but also strong representations to other Government departments that constructional materials be made available for engines, light aircraft and gliders.

We do not envy the members of the Royal Aero Club committee which is to be formed to administer the Kemsley fund. They will have a difficult task, and it may well be that they will meet with many forms of frustration. Their easiest problem will be that of helping to

put gliding within the reach of many. There are a large number of possible sites in the country at which winch-launchings can be made, and not a few from which aircraft launching to greater heights is possible. Most of the latter are sufficiently far away from air routes and their airports to avoid interference with air transport, although the R.A.F. may be a different problem. But with a little give and take by all concerned it should be possible to arrive at a workable compromise.

The outstanding advantage of Lord Kemsley's offer is that it will enable many more people to taste the joys of flying, but the situation is not without its amusing side when one considers it: a democratic Government, which might have been expected to be in favour of doing all it could to make flying available to the many, has to rely on the generosity of a private individual in order to realize what one must assume to be its ideal!

Collaboration

WHEN civil aviation was taken away from the Air Ministry and a separate Ministry of Civil Aviation was formed, it was obvious that the splitting-up might result in a certain amount of duplication. That was part of the price we had to be prepared to pay for independence of control by Service interests.

Air traffic control on Empire routes was one of the spheres in which duplication was to be feared, and it is therefore good news to be told by the Air Ministry that a new air traffic control for British routes has been established. Less satisfactory, because of its vagueness, is the form of the announcement, which leaves one in considerable doubt as to details. What does emerge is the fact that the Air Ministry, the Admiralty and the Ministry of Civil Aviation are all collaborating.

This is as it should be. With the R.A.F. stationed overseas, it was rather absurd for M.C.A. to establish separate air traffic controls for civil aircraft only where the R.A.F. already had, or would have in the future, bases and equipment that could be applied to both Service and civil use. Such things as navigational aids, meteorological reports and forecasts, radio, telecommunications, and services of that nature come within the scope of the new air traffic service. After all, there is not much difference between sending out signals to a Lincoln P-for-Percy and to British civil aircraft G-VXYZ. Just where the newly formed International Aeradio Limited stands in relation to the new set-up is by no means clear, but since that organization is based, as to shares, on a 70 per cent holding by the three Corporations, it is to be assumed that it has been allotted a place.

From the Service point of view also the combination of Air Ministry, Admiralty and civil aviation interests is logical. With the granting of independence to India and Burma, with certain difficulties in Egypt and Palestine, and with Ceylon having ambitions also, the problems of Empire defence bases have changed and in some ways become more difficult. Long-range aircraft will enable us to have strong-points in West and East Africa, Malaya, and, of course, Australia and New Zealand. But to ensure effective operation of such aircraft an efficient ground organization is obviously necessary. With the two Services and civil aviation working together, there is every opportunity for really first-class equipment and service, to the benefit of all concerned.

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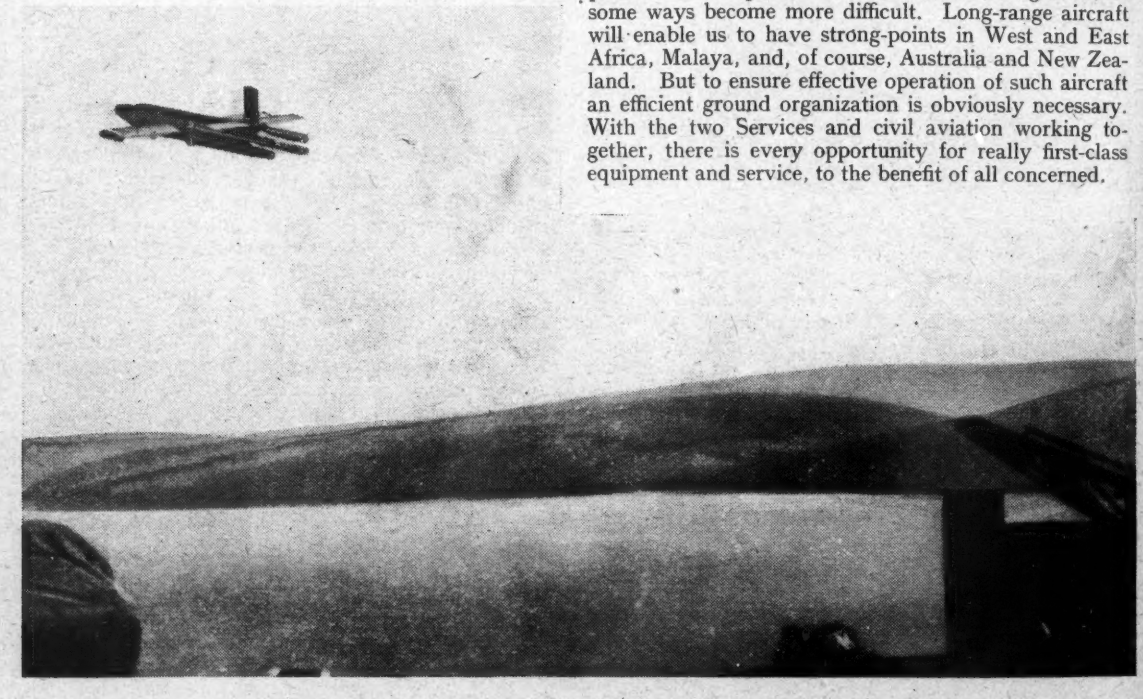


LAUNCHING OF A STOOGE: Smoke tracers are carried on the wing tips of this Fairey-guided missile, described on page 344. The irregular appearance of the nose is due to the counter-balance weight for the booster rockets. Both items are jettisoned a few moments after take-off and a "pilot" on the ground then takes over control.

FLYING-WING DEVELOPMENT

An enlargement from a ciné-film showing the Northrop MX-324 rocket-propelled aircraft on its first flight. In this pioneer aircraft the pilot lay prone.

Research Aircraft, Fighters, "Buzzbombs" and Bombers by Northrop: An Early Rocket-propelled Aircraft

By JOHN W. R. TAYLOR

DURING his recent visit to the United States, as already remarked in *Flight*, Mr. John Cunningham told engineers at the Northrop aircraft factory that, although Britain leads the world in the development of jet-propulsion, America is setting the pace in the design of flying-wing aircraft. As it seems probable that reaction-propulsion will be used to full advantage only in flying-wing layouts, this is quite a challenge to British designers. Whether or not it is true is a matter for conjecture, especially now that the A.W.52 has put in an appearance; but, if American designers are in fact ahead of us there is little doubt that Northrop have put them there. They built their first flying-wing some eighteen years ago, and the experience gained since then in the development of some thirteen different prototypes has enabled them to produce the huge new YB-49 jet-propelled flying-wing bomber, details of which were given in *Flight* of March 20th.

The little machine built by Northrop in 1929 was not a true flying-wing as insufficient aerodynamic data was available then to enable its designers to make it stable without a tail; so it had an orthodox tail unit carried on two very stalky booms. But it was a start, and many of the features it introduced are retained on the YB-49. Although it flew quite well, Northrop built no more flying-wings for ten years; but in those ten years other designers, such as Britain's G. T. R. Hill, the German Lippisch, and the Russian Kalinin had begun to solve some more of the problems of tailless flight.

THIS year's Wilbur Wright Memorial Lecture is to be given on May 29th by Mr. J. K. Northrop, who has chosen as his subject "The Development of All-wing Aircraft."
It is hoped that this article will serve as a useful background to the more detailed account which Mr. Northrop may be expected to give in his lecture.

Northrop claim that their N-1M of 1940 was the world's first successful all-wing aircraft. It was a small machine, just big enough to house a pilot and two engines in its centre-section. The wing leading edges were sharply swept-back and the tips cranked down at 35° to give improved stability. Over 200 successful flights were made with the N-1M, and these gave the first really reliable performance data on modern flying-wing types. The little machine proved so stable and easy to handle that the cranked-down wing-tips were dispensed with after a time, so that it was controlled solely by its combined ailerons and elevators, which were named "elevons."

A Prototype Preserved

Northrop seem to be about the only people so far to have had much success with these simplified controls, for even the latest flying-wing aircraft built by other companies retain also some form of vertical control surface. At any rate the U.S.A.A.F. consider the N-1M such a great contribution to aviation development that they are going to house the prototype in their new museum.

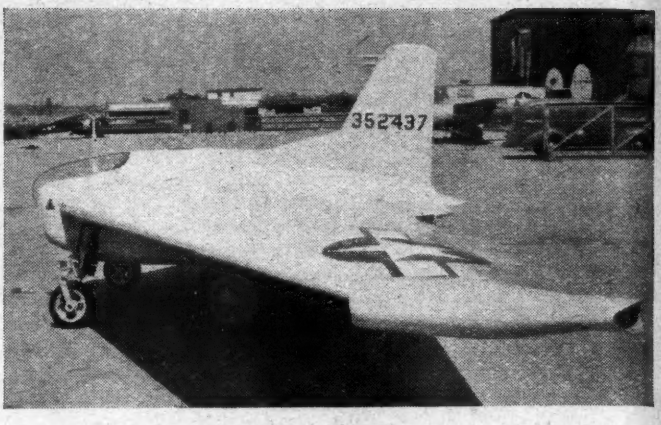
Following the success of the N-1M, the U.S.A.A.F. awarded Northrop a contract for four slightly larger aircraft of the same type, powered with two 325 h.p. engines; these were desig-

FLYING-WING DEVELOPMENT

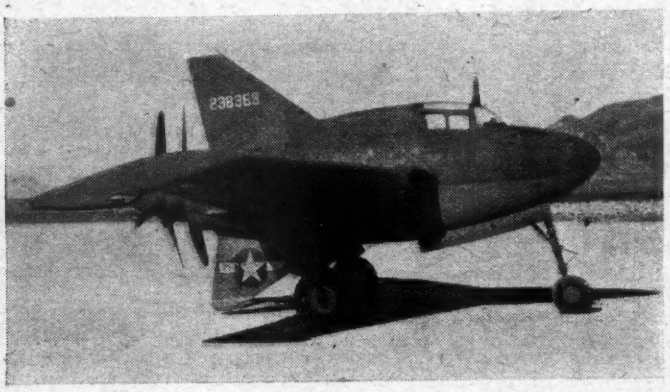
nated N-9M. Like the modified N-1M, they had straight wing-tips, but had sweep-back on their trailing edges as well as the leading edges. Fixed wing-tip slots were also fitted experimentally to the N-9M, and it was found that these considerably improved the machine's slow-flying characteristics. An interesting feature of this aircraft was that the propellers were driven through a hydraulic coupling. As a result, when the engines were started up the pusher propellers did not begin to turn immediately. Instead, they gradually picked up speed as the hydraulic gear filled with oil, which gave a very strange effect.

The N-1M and N-9M were both very interesting experimental types, but were not serious fighters. On the other hand, the XP-56 of 1943 was a fast and aggressive little interceptor with a high-powered engine. It was not a true all-wing aircraft, as its cockpit and engine were housed in a small nacelle, but it incorporated a number of very interesting features. For instance, it was built entirely of magnesium, welded throughout by the patented Northrop "Heliarc" process. Its air-cooled engine was completely buried in the fuselage, and it was the first pusher aircraft to have a contra-rotating propeller. The wing-tips were swept-down like those of the original N-1M and, in addition, fixed vertical fins were fitted above and below the nacelle.

While the XP-56 was being developed an even more interesting aircraft was taking shape in the company's experimental shop. Veiled in secrecy, this "Project 12," or MX-324, was America's first military rocket aircraft. It had a span of less than 30 ft and a fixed "trousered" undercarriage, and was built chiefly to test the practicability of rocket-power for aircraft and a prone position for the pilot. The MX-324 was conceived as a rocket aircraft in September, 1942. An A.A.F. contract for its construction was issued early in 1943, and the first extended flight as a glider was made by John Myers, now Northrop's vice president in charge of sales, on October 2nd, 1943. By then the Aerojet Engineering Corporation of Azusa, California, had made considerable progress with their XCAL-200 rocket motor, and it was decided to use this in the MX-324. The engine weighed 427 lb, and was housed neatly inside the squat wing, complete with four pressure tanks, two propellent tanks, and the hydraulic and electric controls. The only outward and visible signs of the metamorphosis from a glider to a powered aircraft was the rocket tail-pipe which projected beyond the trailing edge. The fuel used was monoethylaniline, and the oxidizer was red fuming nitric acid.



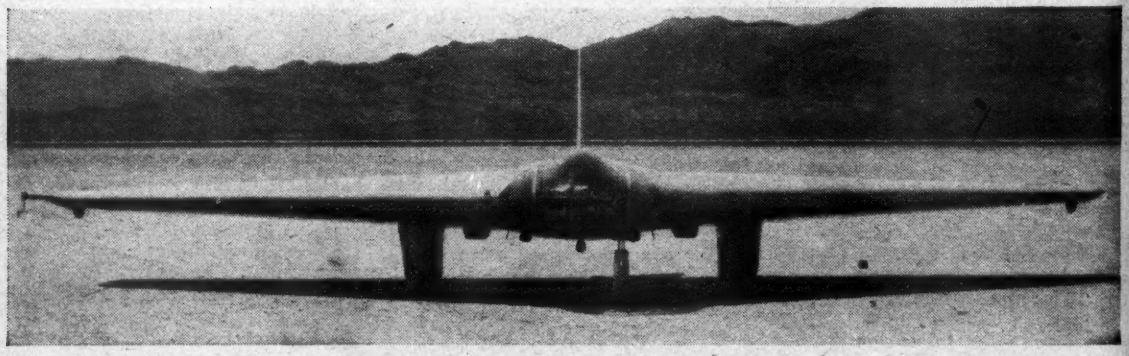
A four-wheel undercarriage, prone pilot and twin Westinghouse turbine jets characterized the XP-79 fighter.



Perhaps the most unusual fighter prototype of the war years was the Northrop XP-56 with its contra-rotating propeller and no horizontal tail surfaces.

Rocket-powered Flight

The completed aircraft was taken to Harper Dry Lake, in California, in the early summer of 1944. Ground runs of the rocket motor began on June 20; two days later it was run at full power, and on the 23rd Northrop's test pilot, Harry Crosby, made the first taxying trials.

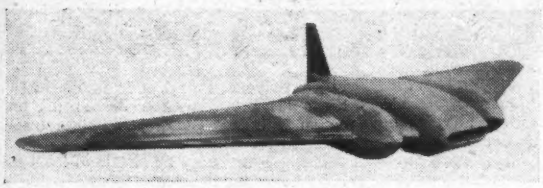


The pilot lay prone in the rocket-powered MX-324. Note the offset nose wheel. Like the main wheels, this was non-retractable.

FLYING-WING DEVELOPMENT

As a result of these some modifications were made to the aircraft, but it was ready for its first flight trials by the morning of July 5. The MX-324 was towed up to 8,000 ft behind a Lockheed Lightning, then Crosby released the tow-line, rested his head on the supports that enabled him to look straight ahead while lying on his stomach, and pressed the starter trigger of the rocket motor. With a long plume of smoke belching from its trailing-edge the little aircraft raced along for five minutes and then glided gently down.

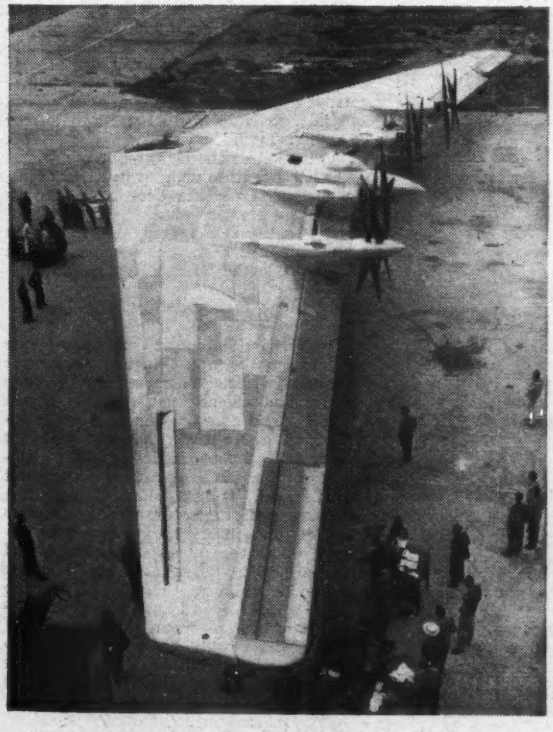
The MX-324 made several more powered flights, including a number at the U.S.A.A.F. Base at Muroc Dry Lake, but it had been obvious from the start that the 200 lb thrust Aerojet motor was not powerful enough for really effective use. As more powerful rocket units were not



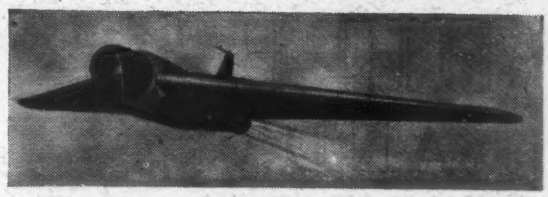
An early type of experimental flying bomb built by Northrop for the U.S. Army.

then available, Northrop redesigned the aircraft with two turbine jets, and it became the XP-79 "Flying Ram."

The XP-79 was more than just a new flying-wing aircraft; it was designed to revolutionize fighter tactics. The idea was to race after an enemy aircraft and knock off its wing or tail by ramming with the heavily armoured leading edge. Unknown to Northrop, Lippisch was working on similar lines in Germany.



First prototype of the B-35 flying-wing bomber. A jet-propelled development will fly this year.



Manufactured in quantity for tests by the U.S. Army, the JB-1A flying bomb carried nearly two tons of explosive in the wing centre-section.

The "Flying Ram" was a beautifully clean fighter with a loaded weight of 9,600 lb. It was basically similar to the MX-324 in layout, except that it had two fins above its engines, and, like the XP-56, it was constructed of welded magnesium. Once again a prone position was used for the pilot, and Northrop claimed that this would enable him to withstand a 12 G pull-out without blacking out, so making possible fast, tight combat manœuvres. A "secondary" armament of four 0.50in machine-guns was fitted in the centre-section, and other features included a four-wheel undercarriage and a "bellows rudder" in each wing. The latter was first tried out on the XP-56. In normal flight air flowed straight through horizontal passages at each wing tip, but when rudder action was required, the pilot could operate a shut-off valve to direct the airflow to the bellows.

Bombers and Missiles

The end of the war prevented the XP-79 from showing its paces in action, and it did not go into production, but Northrop have by no means lost interest in flying-wing fighters, as future developments will show. Meanwhile they are building for the U.S.A.A.F. a highly successful series of flying-wing bombers and pilotless missiles. The first of the bombers was the well-known B-35, which first flew in June, 1946, and has since successfully completed a flight-test programme at Muroc Army Air Base. The original contract called for fifteen B-35s, but in 1945 Northrop asked if they could install jet engines in all but the prototype to improve performance. The U.S.A.A.F. agreed to the fitting of eight 4,000-lb-thrust General Electric engines in the second and third machines, but asked for the remainder to be fitted with Wasp Majors, as originally specified, as these gave a more useful range.

For the moment the emphasis is still on military aviation, and Northrop are also working on a series of interesting but unpleasant missiles in the style of the all-too-familiar V-1 Flying Bomb. The original Northrop "buzz-bomb" was an all-wing aircraft powered by two General Electric turbine jets. It had a single direct-entry air intake for the engine in its centre-section, and the warhead was carried in two bulges, one on each side of this. Several of these missiles were supplied to the U.S. Army, but production has now been switched to an improved type—the JB-1A—which uses a single engine based on the German V-1's Argus impulse-duct.

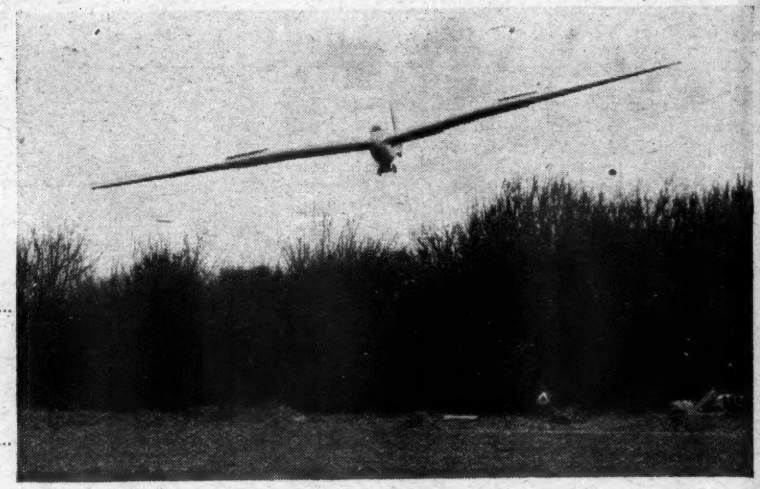
That is as far as the story of Northrop flying-wing development goes at the moment. But, like the old American serial films, there will undoubtedly be plenty of interest in the next instalments.

HAZARDOUS ARGENTINE ROUTE

AEROPOSTA, of Argentina, have taken delivery of their third Dakota, of which six have been ordered. The new aircraft was collected by Señor Bottaro-Lopez, who is in charge of engineering for Aeroposta and was formerly the chief engineer of Argentina's D.A.C., the counterpart of the American C.A.A. Before the formation of this new fleet the company had operated French and German aircraft exclusively. Aeroposta fly the most southern airline route in the world, and have a remarkable safety record, especially in view of the mountainous country over which they operate. There have been no passenger fatalities since the company was formed in 1928.

The route over the mountains from Commodore Rivadavia to Rio Grande is considered to be one of the world's most difficult routes covered by scheduled services.

HERE AND THERE



CUTTING IT FINE: A Kranich II comes in over the airfield boundary at the Leicester Gliding Club's Easter rally at Ratcliffe.

Italian "Roadable"

IT is not surprising, in view of the Latin love of motoring, that roadable aircraft should now be the subject of study in Italy. The Aerauto P.L.2.3C. is an 80 h.p. 3-seater with pusher propeller and nose-wheel undercarriage.

No Tents

ESTIMATED to have cost more than a million dollars, one of the most modern air terminals in the Caribbean area was officially opened for traffic on March 1st, when the Governor of Curacao dedicated the new airport building at Hato. For the comfort of passengers and visitors, the building has been provided with a restaurant overlooking the airfield, several bars and kiosks, and a well-furnished waiting room. Baggage is placed in special lifts and carried underground to waiting aircraft. Arriving and departing passengers have separate immigration and Customs offices to avoid congestion and confusion.

If Mahomet Won't

NEWS of an interesting advertising scheme comes from America. Delta Airlines have issued a folder with some sand glued to it, and the theme is that only yesterday the sand was part of Miami Beach, and although Delta cannot bring any more of the beach to you, it can take you to the beach in less than six hours from Chicago.

Model Championship

A.S.T. have given permission to the Southampton Branch of the Air League of the British Empire to hold the Southern Area Model Flying Championship on their airfield at Hamble, Hants, on May 18th. These competitions will be held under S.M.A.E. rules and there are five classes:— Class 1: Open. Rubber duration (R.O.G.). Class 2: Gliders—open. With a special prize for tailless. Class 3: Flying scale (R.O.G.). Class 4: Power driven. Petrol and diesel. In two heats (a) best duration flight; (b) precision flying. Class 5: Control line—Aerobatic competition.

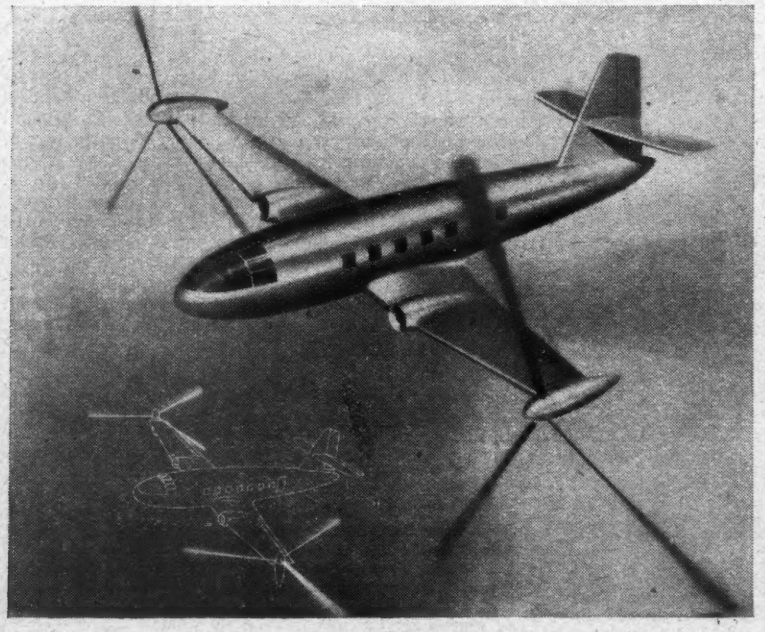
Entry forms may be obtained from the following committee members:—

Captain Ward, 26, Blenheim Road, Eastleigh, Hants. (Secretary, Eastleigh Model Club.)

Mr. B. Welsh, Red Croft, Oaklands Way, Bassett, Southampton. (Secretary, Southampton Model Aeroplane Club.)

Mr. Vincent, Portsmouth and District M.A.C., 10, Kingston Road, Portsmouth, Hants.

Mr. J. Dynan, Education Officer, Folland Aircraft Ltd., Hamble, Hants.



BEST OF BOTH WORLDS? Mr. Le Page's suggestion for combining fixed and rotary wings in one aircraft. The "ghost" view shows it as a helicopter.

Wing Leader in B.E.A.

GROUP CAPTAIN DUNDAS, D.S.O. and Bar, D.F.C., a Battle of Britain pilot, has joined the staff of British European Airways. He commanded No. 56 Squadron when it was first re-equipped with Typhoons, became a Wing Commander in November, 1942, and formed the first Typhoon Bomber Wing. G/C. Dundas joined the Desert Force at Malta and led a Spitfire wing of five squadrons, which in six weeks destroyed between sixty and seventy aircraft. In September, 1946, he started as a station assistant in B.E.A., but is now acting as assistant in the foreign liaison branch.

Helicopter Plane

DURING a statement before the House Interstate and Foreign Commerce Committee Mr. W. Laurence Le Page outlined a scheme for a type of aircraft which would combine the high-speed advantages of fixed-wing aircraft with the low-speed characteristics of the helicopter. He visualized it as an aircraft with small wings, suitable for fast cruising, carrying rotors at the wing tips and engines inside the wing. For forward flight the rotors would be turned into a vertical plane and would act as airscrews, while for take-off and landing they would be turned horizontal, as shown in the sketch on this page.

The wings could be small, since they need not have the area necessary for landing, and this would balance the extra weight of rotors, transmission, etc. Owing to their large diameter the slow-running rotors would be very efficient as airscrews.

HERE AND THERE

The Balloons Go Up

THE first post-war international balloon race is due to start from The Hague on Liberation Day, May 15th. It is expected that there will be entrants from Holland, Belgium, Britain, France, Italy and Switzerland.

Lord Ventry, the British airship enthusiast, will accompany the Dutchman M. Boesman.

Playing Their Part

THE Alan Turner Opera company, a section of Ernest Turner Group factory welfare, has been producing operetta under the direction of Mr. Alan Turner since 1926 and British premieres of several Johann Strauss musicals have made this amateur company famous.

This year's show was "The Queen's Lace Handkerchief" produced at the Grand Theatre, Derby.

Production was on a very lavish scale, employing over £3,000 worth of costumes. The cast numbered over 150. The entire production, lyrics and libretto were written by Mr. Alan Turner.

Over £2,500 has been raised by A.T.O.C. for charity since 1926.

Veteran Airscrew

WHAT must be something of a record was established by a de Havilland airscrew recently returned to the makers by B.O.A.C. It was originally fitted to a Short C-class flying-boat in 1937 and had been in continuous service with these boats until the boats themselves were broken up. The only replacements were the normal wearing parts such as blade bushings. Blades and barrels were the originals.

For those who like statistics it may be pointed out that this airscrew is estimated to have flown 1,736,000 miles, to have made 1,488,000,000 revs in the course of its working life. The distance travelled through the air by each blade tip was something like 11 million miles!

APPROPRIATELY NAMED: Mr. Horace T. Pentecost in the seat of his "Hoppicopter." It seems just possible that the machine may jump into the air, aided by the ground cushion, but we have never seen pictures of it doing so.

WILD OATS? For the first time in England corn was sown from the air at Blatherwycke, Northants. Ten acres of a 50-acre field were seeded in eight "bombing" runs by a Miles Aerovan, piloted by S/L Nelson. The enterprising farmer was Mr. J. W. Tomkins and the experiment was tried because of the late season and the sodden state of the ground. Presumably the seed was harrowed in afterwards. Doubtless there is still much research work to do on aerial seed-hoppers and the effect of slipstream on seed distribution.

Flood Flight

SNOW and floods which paralysed—or at any rate hobbled—all forms of ground transport, often gave aircraft a chance to demonstrate one of their many advantages. People who had never before had both feet off the ground used Britain's internal air services to get from one end of the country to the other, and were no doubt duly impressed by the comfort of air travel as well as its speed.

But even British European Airways itself was faced with "flood trouble" when it was found that the Vickers factory at Weybridge was cut off from approach by road and some Viking spares were needed by the Supplies Branch at White Waltham.

This was scarcely a problem to B.E.A., however, because there was enough firm ground at "high tide" for one of their Austers from the Communications Flight to land outside Vickers' works, collect the wanted bits and pieces, and hop back to White Waltham with them.

News in Brief

WE have been asked by Dorland Advertising, Ltd., to point out that in their advertisement for Coopers Mechanical Joints in our issue of March 27th it was erroneously stated that Coopers No. 14 gaskets were used in the Theseus airscrew turbine engine. The product actually supplied by Coopers was their Labyrinth discs and filters.

* * *

Electro-Hydraulics, Ltd., are among the firms which have taken stands at the Centenary Industrial Exhibition in Parr Hall, Warrington. The exhibition will be open daily from 2.30 to 8 p.m. (except Sundays) from April 19th to 26th.

* * *

Captain Geoffrey Wickner's Halifax, *Waltzing Matilda*, which he flew from England with passengers, has been purchased by Air Carriers, who are opening a special air freight service between Australia and China, through Java.

Plesseys have appointed Mr. H. Fox-Wright as sales manager of their Government and Aircraft Division. Prior to joining the Plessey company ten years ago, Mr. Fox-Wright was with the de Havilland Aircraft Co. and was also a student at their aeronautical technical school.

* * *

A. J. Philpot, C.B.E., M.A., B.Sc., F.Inst.P., director of the British Scientific Instrument Research Association, which is the oldest research association in the country, has been appointed director of the Scientific Instrument Manufacturers' Association of Great Britain, Ltd., as from April 1, 1947. at the same time continuing in his office as director of the British Scientific Instrument Research Association.

Mr. Philpot will function from the offices of the B.S.I.R.A., at 26, Russell Square. London, W.C.1.

UNVEILED

New and Improved Types of British Service Aircraft: Prototypes and Projects in All Classes

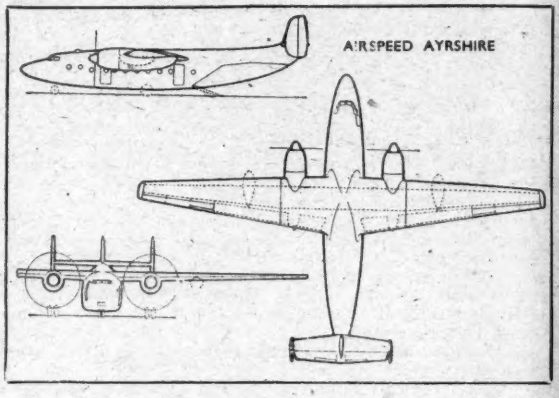
IT is now possible to mention by name, and in certain cases to describe and illustrate, some new types and variants of British military aircraft. Least familiar of these are the Westland Wyvern T.F.1., Avro Shackleton G.R.1 and Blackburn S.28/43. New names include Supermarine Attacker (E.10/44), Supermarine Seagull (S.14/44), Avro Atheno T.1. and Boulton Paul Balliol T.1., the last two being turbine-powered trainers. For convenience of reference the various types will be discussed under the names of their manufacturers.

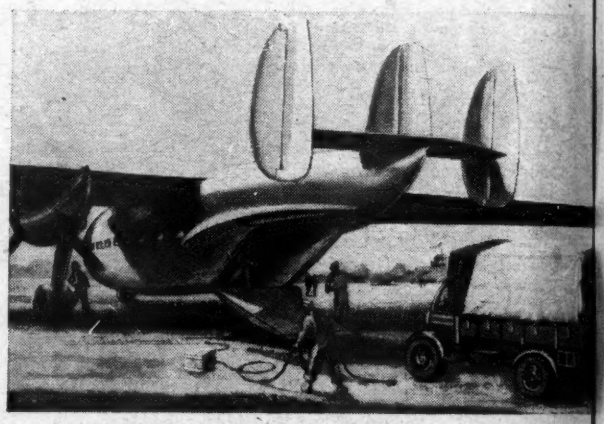
AIRSPEED

ALTHOUGH it is not likely to be built in quantity for the R.A.F., the Airspeed Ayrshire 1 military transport (two Bristol Centaurus 130 engines) is of definite interest in demonstrating the possibilities of a high-speed military transport developed from a civil passenger carrier—in this case the Ambassador. Designed to M.A.P. specification C.13/45, and bearing the Airspeed type number AS60, the Ayrshire 1 is a medium-range aircraft using the complete wing structure (together with nacelles, power units and undercarriage) of the Ambassador, and with minor alterations, the same tail surfaces. With the exception of the cockpit structure the fuselage, however, has been entirely redesigned, the central portion being square in section, with slightly rounded sides and corners. A total volume of 2,360 cu ft is available for freight stowage, and for loading military equipment two hinged doors, forming part of the fuselage shell, are opened, and the loading ramp, hinged along the floor line, is lowered to the ground. Two separate doors are provided for parachute troop dropping, the high position of the tail surfaces ensuring adequate clearance.

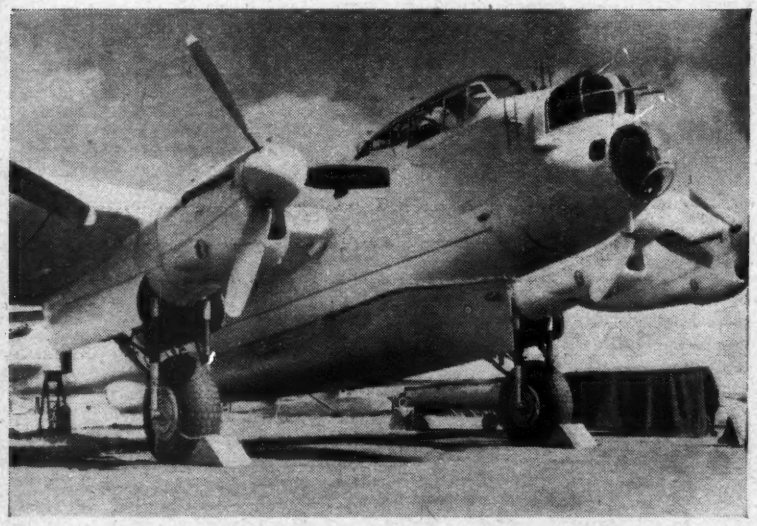
Ayrshire data are as follows: span 115ft; length 80.25ft; normal all-up weight 52,500lb; maximum w.m. cruising speed 202 m.p.h at 10,500ft.

Although the Ayrshire, as such, is unlikely to materialize it is of interest to learn that a civil freighter version of the Ambassador has been designed. This incorporates many Ayrshire features, including a retractable loading ramp.





Rapid handling of wheeled and tracked vehicles and of bulky freight loads are catered for in the design of the Airspeed Ayrshire, a proposed military development of the Ambassador.



A large airborne lifeboat stowed snugly in place of the bomb bay of an Avro Lancaster ASR aircraft, which exists in Mk I and II forms. Conversion was carried out by Cunliffe-Owen.

AVRO

SHACKLETON G.R.1 is the official title of the new long-range Avro general-reconnaissance aircraft for Coastal Command. Four Rolls-Royce Griffon engines are fitted. It may be expected that the Shackleton will in certain respects resemble the Lincoln bomber, but the allocation of a new name probably signifies certain major changes.

A second Avro development of importance is the Athena T.1 (T.7/45) advanced trainer powered by an Armstrong-Siddeley Mamba or Rolls-Royce Dart airscrew turbine. In its general characteristics the Athena resembles the Boulton Paul Balliol, being a low-wing monoplane with provision for an instructor and pupil side-by-side and a second pupil behind. The cockpit enclosure appears to offer excellent all-round vision for all crew members.

UNVEILED

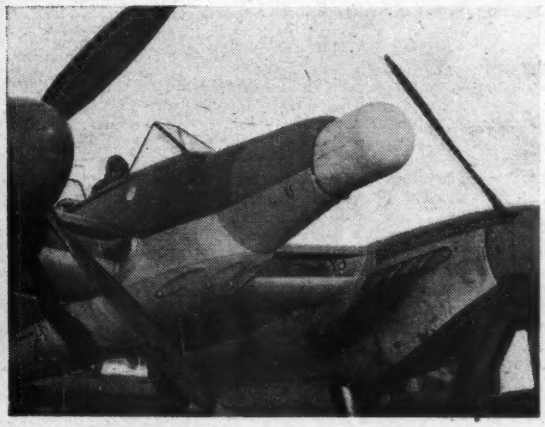
total tankage of 404 gallons, half of which is carried internally and half in under-wing tanks. The tare weight is 6,927lb and the all-up weight 11,970lb, giving a wing loading of 45 lb/sq ft. Flying at a weight of 9,500lb, the Vampire F.III attains 525 m.p.h. at sea level, 540 m.p.h. at 17,500ft and 526 m.p.h. at 30,000ft. At sea level the rate of climb is 3,800 ft/min, and at 30,000ft 1,550 ft/min. A pressure cabin is fitted and the operational ceiling is 45,000ft.

In view of the still-prevalent impression that jet-propelled fighters are suitable only for short-range operation it is especially interesting to record the endurance of the Vampire F.III as 3 hours at 30,000ft, and the range as 1,390 miles.

Externally the F.III is characterized by a low-set tail plane and fin and rudder assemblies of new design.

Admirers of the Hornet and Sea Hornet—the fastest airscrew-driven fighters of their class in the world—will be interested in the following details of three new variants.

The Sea Hornet N.F.21 is a two-seat Naval night fighter, which may be alternatively employed for high-speed recon-

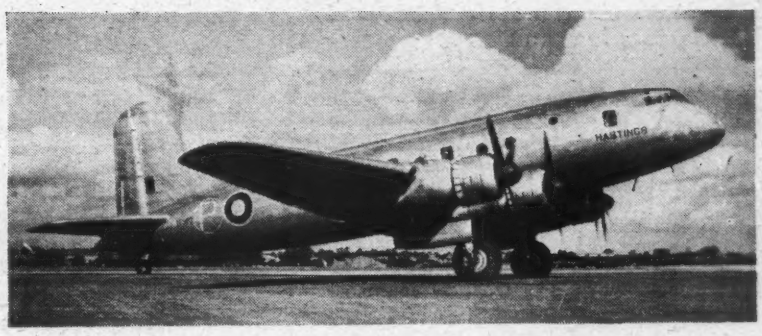


The new nose of the Sea Hornet NF 21 two-seater night fighter developed for Naval Aviation.

naissance or on "strike navigator" duties. Range and tankage are substantially as for the Sea Hornet Mk.XX, which has a typical range with operational load of 1,230 miles. The N.F.21 carries a radar scanner in the redesigned nose, flame dampers for the exhausts of the Merlin engines, and a rear cockpit hood somewhat resembling that on the early Beaufighters. Complete performance data are not yet available, but the first prototype is already flying.

A long-range version of the Hornet F.I, the sub-type F.III, has a total internal tankage of 540 gallons and external provision for two tanks of 100 or 200 gallons capacity apiece. With 740 gallons of fuel the flying weight is 19,470lb, and with 940 gallons, 21,080lb. Including an allowance for fifteen minutes' combat, the Hornet F.III with maximum tankage has a range of 2,500 miles at 20,000ft or 30,000ft.

Development of the Hornet as a photographic reconnaissance aircraft has already been mentioned, and the following details may now be given of the Hornet P.R.II. Tankage is the same as for the F.III and the range (no combat allowance) is 2,900 miles at 20,000ft, or 2,650 miles at 30,000ft. No guns are fitted but two F.52 cameras are



A recent view of the Handley Page Hastings I. A substantial order for this imposing military transport is now being filled.

mounted between bulkheads 4 and 5 and there is a K.17 camera in the forward part of the gun bay. Provision is made in the aft fuselage for a F.45 oblique camera.

FAIREY

A NIGHT fighter version of the Fairey Firefly IV is designated Firefly N.F.IV. It has readily detachable flame dampers and, of course, carries the familiar radar nacelle.

Griffon-powered developments of the Fairey Barracuda are the T.R. V and VI.

GLOSTER

APART from the dual-control trainer version of the Meteor mention may now be made of an earlier photographic reconnaissance version (Meteor P.R.III). The Meteor IV is, of course, similarly adaptable for reconnaissance.

HANDLEY PAGE

THE impressive appearance of the Handley Page Hastings C.1 (four Bristol Hercules), soon to be issued to R.A.F. transport squadrons, is already familiar to *Flight* readers. A recent photograph appears here, and it is now possible to state that the crew numbers five. Dimensions are: span 113ft; length 81ft 8in; wing area 1,408 sq ft.

Like the Hermes, its civil counterpart, the long-fuselage Mk.II version of which should fly in about three months' time, the Hasting is notable for its exceptionally clean design. This is reflected in performance, and though actual figures for the Hastings may not yet be quoted, the Hermes I, which is similar in all essential respects, has a top speed of 355 m.p.h. at 22,700ft.

A distinguishing feature of the Hastings is the large loading door, served by a special ramp in the port side of the fuselage. Other differences concern internal equipment.

HESTON

THE twin-boom A.O.P and communications aircraft with tricycle undercarriage and Gipsy Queen engine, now being built by Heston Aircraft has been designed to Specification A.2/45. Its span and length are 44ft and 34ft respectively.

VICKERS-ARMSTRONGS

THE Vickers-Armstrongs Windsor bomber is, of course, not a new design, but the following note by Mr. Rex Pierson, Chief Engineer of the Aircraft Section of Vickers Armstrongs, Ltd., is of interest because this type has been so little publicized.

"In the Windsor," says Mr. Pierson, "geodetic construction attained outstanding development, the structure being principally of light alloy geodetics with special pretensioned metallic fabric covering. The four power units were mounted in line in nacelles, each of which formed a housing for a single retractable mainwheel unit. The prototype machine was laid down in 1942, and the first flights were made in October, 1943, the immediate objective being

UNVEILED

to get this new type into production with the minimum of delay as a high-speed bomber for operation at oxygen heights with pressurization. The production machines were to have had some novel features in gun armament, but they were not ready in time to go into active service, and the contracts were liquidated following the cessation of hostilities.

The novel armament referred to by Mr. Peirson took the form of remotely controlled barbettes.

Developed from the Viking, the Valetta has been ordered by the R.A.F. for general transport duties. It will have a different mark of Hercules from the civil machine; the floor will be strengthened to take concentrated weights and there will be a large entrance door 8ft 6in wide. The gross weight will be 36,000lb—nearly a ton greater than that of the Viking.

Apart from its employment as a troop carrier, freighter and ambulance, the Valetta will be equipped for glider towing.

The name "Attacker" has been selected for the Supermarine E. 10/44 jet fighter powered by a Rolls-Royce Nene. The maximum speed is of the order of 600 m.p.h.

VICKERS-ARMSTRONGS (SUPERMARINE)

"ATTACKER" is the name which has been allocated to the Supermarine E.10/44 fighter powered by a Rolls-Royce Nene jet engine. Dimensions of the Attacker, which is capable of speeds of the order of 600 m.p.h., are: span, 36ft 11in; length, 37ft 6in; height, 9ft 11in; wing area, 226 sq ft.

Apart from the first prototype, which has now completed a considerable amount of flying, some additional machines are now coming through the Supermarine shops.

The Griffon-engined S.14/44 amphibian flying boat with variable-incidence wing has provisionally been given the name Seagull. The same name, it may be remembered, was used for some early Supermarine amphibians prior to the Walrus.

Dimensions of this interesting type are: span, 52ft 6in; length, 44ft 1½in; height, 18ft 4½in; folded width 23ft 6in; wing area, 432 sq ft.

WESTLAND

AS its official designation denotes, the Westland Wyvern F.T.I is a naval torpedo fighter aircraft. Powered by the new Rolls-Royce Eagle sleeve-valve engine, it will doubtless prove to have a higher performance than any machine in its category. It will be interesting to see if it challenges the Thunderbolt (P-47J) claimed as the fastest airscrew-driven fighter.

The name Seagull has graced a number of successful Supermarine amphibians and has now been chosen for the Griffon-powered S. 14/44.

ENGINES

It is perhaps indicative of the advances made with power units that, officially, all details of piston engines as a class are now released unconditionally. This does not, of course, apply to combinations of piston and gas turbine engines. Combination engines, or compounded engines, for aircraft have been under development for a considerable time, and it is anticipated that such units will eventually be tried out in large, long-range aircraft where the extremely low fuel consumption, one of their most important features, can be exploited.

Some restriction on the publication of details of certain well-known gas turbines still exists, however. In this group are the three Armstrong-Siddeley airscrew turbines: the Mamba I, the Python I and the Python II. The Mamba I is, of course, a small airscrew turbine (1,010 b.h.p., 320lb thrust, 1,135 total equiv. b.h.p.), and it is shortly to fly in the nose of a four-engined Avro flying test bed. All available information about the unit itself has already been given in *Flight*.

The Python I (3,670 b.h.p., 1,150lb thrust, 4,110 total equiv. b.h.p.) will also be familiar to readers, and it has been under development for many months. It is expected to fly very shortly, and the installation of two Pythons in the place of two outboard Merlins of a Lincoln, a plan which is now becoming a common practice for first-flight tests of gas turbines, is well advanced. Of the Python II for which power figures are quoted as 4,100 b.h.p., 810 lb thrust and 4,410 total equiv. b.h.p., little is known. Armstrong Siddeley Motors mention an earlier project, now shelved, for a modified Python with slightly greater power output, but at the present time the company's efforts in this connection are concentrated solely upon developing and perfecting the Python I.

Two Rolls-Royce gas turbines may also be mentioned, namely, the Clyde I and Dart I, both of which have many hours of running to their credit. The Dart I (1,000 b.h.p., 325lb thrust, 1,125 total equiv. b.h.p.) is ready for flight trials and is also being installed in the nose of a Lancaster from which the front turret has been removed.

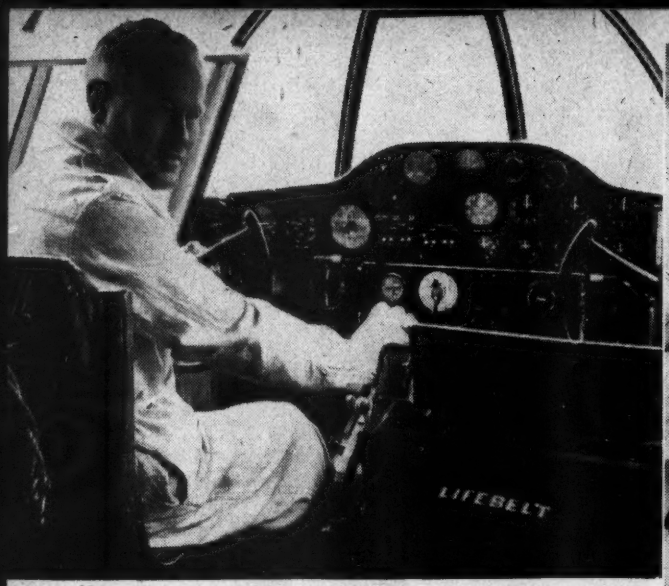
Development of the Clyde airscrew turbine is still proceeding on the test beds, and provisional power figures are 3,020 b.h.p., 1,225lb thrust, giving a total of 3,490 equivalent b.h.p.

From the aircraft company of Roy Fedden Limited is to appear a small airscrew turbine to which the name Cotswold has recently been given. The available details of this unit have already been printed, and the provisional power figures are 1,305 b.h.p., 300lb thrust, 1,420 total equiv. b.h.p.

There are several other extremely interesting pure jet units and airscrew turbines under development, and it is to be hoped that preliminary information concerning some of these will soon be released. At the time of the S.B.A.C. display at Radlett the fact that the Napier Company were working on a variety of gas turbine designs became generally known, and it is to be expected that Bristol's have more in mind than their successful Theseus airscrew turbine and the later Proteus now under development.

It may now be stated that a new Bristol unit will be called the Janus I, and that among Napier gas turbine designs has been one called the Nymph. In addition to these two, a recent de Havilland design, the H3, is on the way, and of special interest will be the very small 250 h.p. turbine unit designed by Power Jets (R. & D.), Ltd., and now under construction.

ARMSTRONG SIDDELEY
TYPHOON
SPORTS SALOON



"Flight" photograph.

Britain's Test Pilots—No. 21

HAROLD LORD PIPER, Chief Test Pilot of Short Bros., Ltd.

H. L. PIPER—"Pip" to all his friends—hails from New Zealand, where he first learnt to fly in September, 1918. At that time there was no direct entry into the R.A.F. (then just six months old) for Dominion personnel; they had to enlist in the N.Z. Expeditionary Force and were later transferred. At the age of 18 he was sent to the Wigram Flying School, and took his ticket on a Caudron with a 45 h.p. Anzani engine. Lateral control was by warping the wings, and instruction was carried out by signs, tapping of struts and, in desperate cases, by shutting the engine off and shouting at one another.

The armistice which concluded the 1914-18 war came before Pip was posted to Europe, and he was discharged in New Zealand. Disappointed, but ever a worker, he got his teeth into the sheep farming business, and motor cycle racing on grass tracks had to take the place of flying thrills. Later, he was able to join the N.Z.A.F.R. and put in a little flying on Mono Avros, Bristol Fighters, D.H.9s and D.H.4s.

Still restless, and wanting very much to see England, he sold his sheep farm in 1927 and came here to take a short-service commission in the R.A.F. He was posted to the famous No. 5 F.T.S. at Sealand—through which so many well-known pilots passed—and went through his initial training all over again. From here Pip was posted to No. 26 (Army Co-operation) Squadron, which was then equipped with Atlases (the squadron is now in Fassburg, Germany, and flies Tempest IIs).

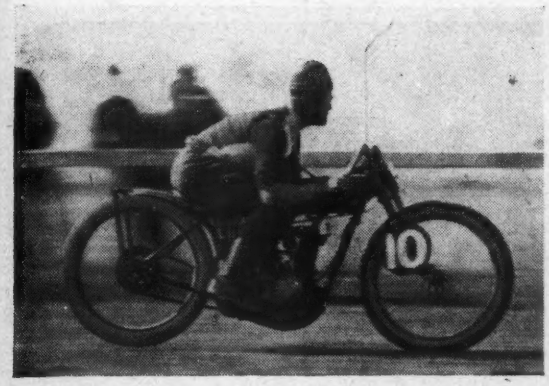
TWENTY YEARS AFTER: In the photograph above H. L. Piper is standing by his "Brisfit" at No. 5 F.T.S., Sealand, in 1927. Top left shows him starting up the engines of a Short Plymouth in Belfast Lough.

In the late twenties and early thirties, long-distance flights by light aircraft were very much the fashion, and Piper had dreamed many times of buying a machine and flying from England to Australia. This was no mean feat in those days, because there was no comfortable chain of runwayed airfields available as there is now. Even petrol supplies had to be organised before the flight started, and it took months of time and effort to get permission to fly over some of the countries.

However, with F/O. Kay (now a Group Captain, and who was C.O. of the famous No. 75 N.Z squadron for a while during the war) he applied for three months' leave to fly to Australia and, with the money left from selling the

THE PAPOOSE: *Mercury* and *Maia* taxying down the Medway to take off for the first air separation. Piper's head can be seen in the top pilot's cockpit. John Lankester Parker is in the lower component.

"Flight" photograph.



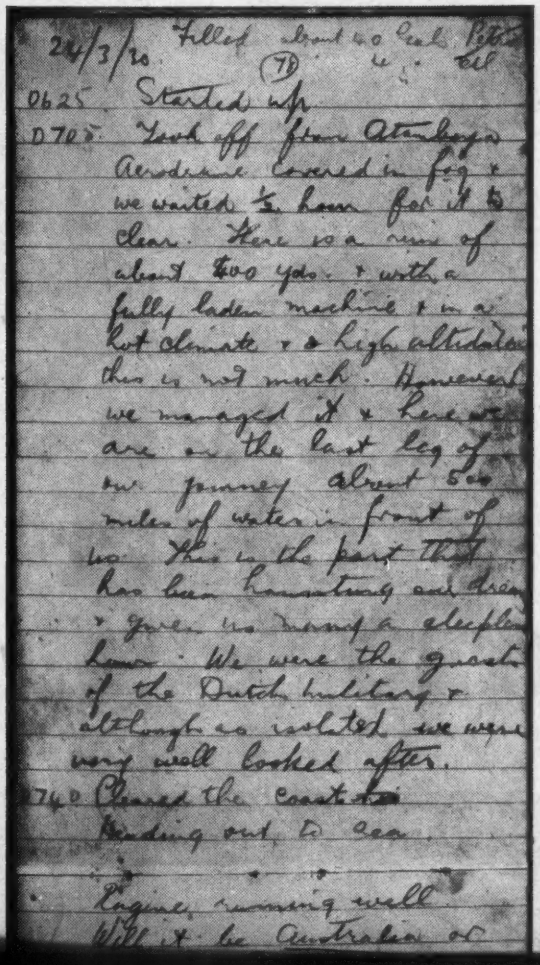
A FLYING START : As a young man, Piper had a passion for grass track racing. He is seen competing in the "Free for All" at Rangiora in 1925.

farm, a Desoutter monoplane with long-range tanks was purchased for £750.

The flight started in the early hours of the 9th of February, 1930, and finished in Sydney on April 3rd. Every day between those dates was one of early morning starting and working hard on the aircraft after flying for the day had finished. All went reasonably well for a while until they lost themselves between Amman and Rutbah Wells. This meant a forced landing in the desert and an arrival at Ziza.

THE LAST LAP : A page from the log kept by Piper and Kay during their flight from England to Australia in 1930.

"Flight" photograph.



24/3/30 Filled dont 40 Gal Petrol (70) & Oil
0625 Started up
0705 Took off from Atembaya Aerodrome Covered in fog & we waited ½ hour for it to clear. There is a run of about 600 yds. & with a fully laden machine & in a hot climate & a high altidude this is not much. However we managed it & here we are on the last leg of our journey about 500 miles of water in front of us. This is the part that has been haunting and dreaming & gave us many a sleepless hour. We were the guests of the Dutch Military & although so isolated we were very well looked after.
1740 Cleared the coast & Heading out to Sea.
Engine running well
Will it be Australia or

"Flight" photograph.

HIGH PERCH : Climbing aboard the four-engined *Mercury* before the first separation flight of the Mayo Composite.

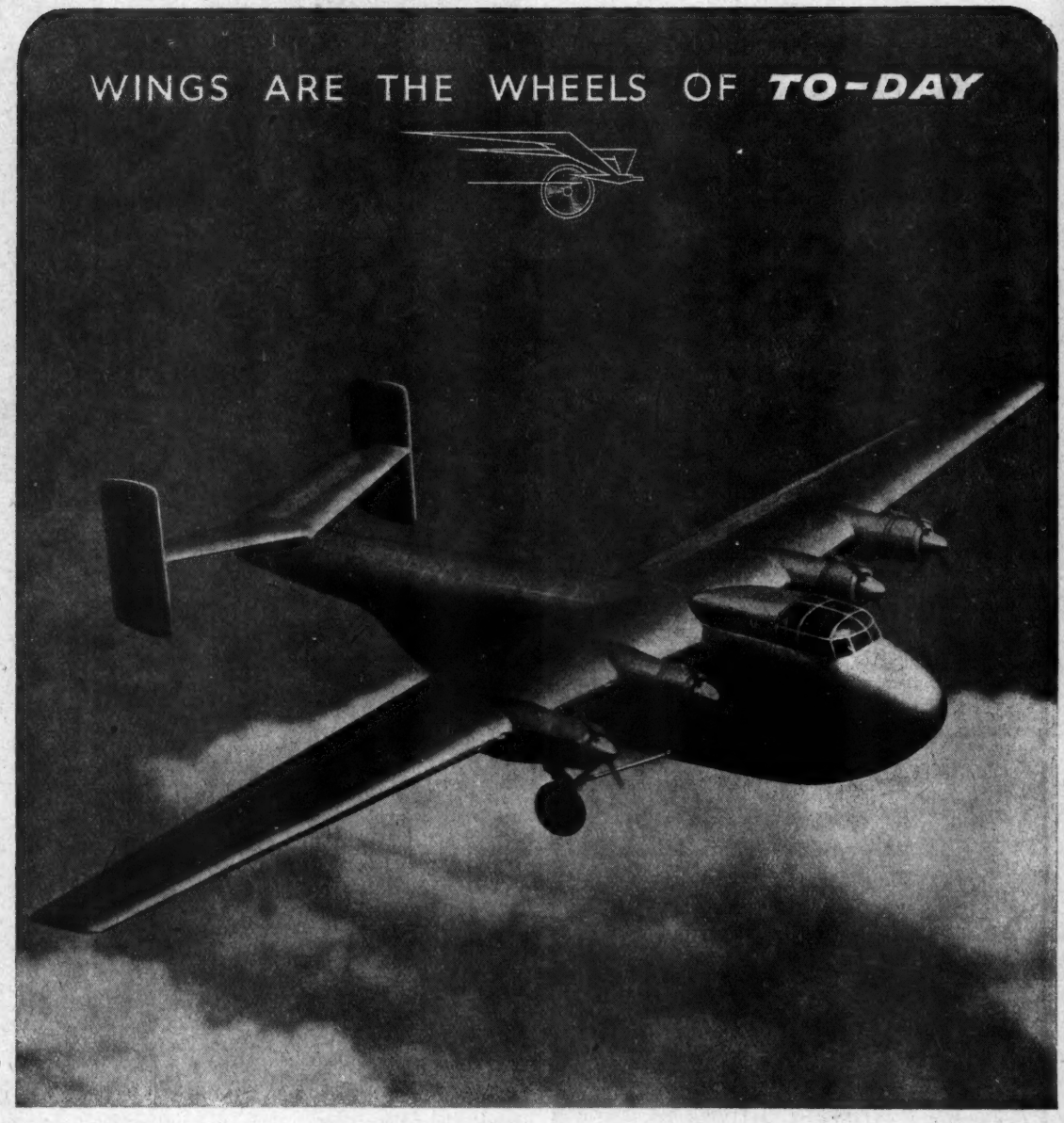
At Jask, on the Persian Gulf, engine trouble set in. After a forced landing it was found that a piston had broken and the metal had got everywhere, even into the other three cylinders. The friction had also caused the piston metal to melt and weld itself to the cylinder walls. A spare piston and cylinder head was fitted, but the damaged cylinder barrel walls had to be cleaned by removing the aluminium with strong caustic soda. From then onwards there were continual little spots of bother, a valve rocker seized, oil pressure kept failing, and carburation troubles—enough to cause ever-increasing anxiety. Another forced landing with engine trouble—this time on the beach at W. Baronga, near Akyab in Burma—added to their worries and held the flight up for nearly three weeks. Even after Singapore little bits of aluminium from the broken piston were still being found under the oil filter valve. It is interesting, however, to know that that Desoutter monoplane is still going strong. It is privately owned by a Mr. Blackmoor, who bought it from Piper for £250.

Joining Shorts

Pip was somewhat overdue from his three months' leave when he eventually arrived back with No. 26 Squadron. Shortly after his return he was posted to Digby as an instructor for a while, and from there went to No. 503 (County of Lincoln) A.A.F. Squadron.

In 1933 his commission expired, and he joined the Gravesend Flying Club as an instructor for a short while before joining Shorts as a demonstration pilot on Scions in February, 1934. With the extreme good fortune of having Lankester Parker as guide and mentor, he started test flying on Singapore IIIs, and later went on to Sunderlands and other Short boats. Then, in 1937, when Short and Harlands started building aircraft, he was posted to Belfast to do their test flying. Although they built aircraft of other firms' designs—their first contracts were for Bristol Bombays and Handley Page Herefords—from the test piloting point of view it was almost like flying prototypes.

In 1938 came the most interesting flying job in Piper's



GENERAL AIRCRAFT LIMITED

FELTHAM · MIDDLESEX

BRITAIN'S TEST PILOTS

career; that of flying the upper component of the Short Mayo composite. The basic idea was to test the possibility of mounting a heavily loaded aircraft on top of a lightly loaded machine, and to launch the heavily loaded aircraft at height.

The Mayo was first flown as an eight-engined biplane, and this flight nearly became the first parting, because Parker, who controlled the whole machine from the bottom half, thought the controls felt very strange. The first parting was intended to be carried out at a height of some 7,000ft just in case either machine played tricks after separation. Actually it happened at about 700ft. Pip's recollection of the parting was hearing Parker's voice over the inter-comm. telling him of the intention to let go, at which Piper did a very large swallow and said O.K.

Parting forces were in excess of 5,000 lb, and the momentary acceleration was somewhat disturbing, but the most frightening part, however, was that neither pilot could find the other for nearly a quarter of a minute, each being in the other's blind spot. An interesting sidelight on the Mayo is that the excellent inter-comm. fitted to all operational aircraft during the war was the direct development of the instruments especially designed by the R.A.E. at Farnborough for Parker and Piper to talk to one another clearly enough not to mishear instructions.

During the war Short and Harlands were busy on a variety of aircraft types. Repairs and alterations were made to Hurricanes, Battles, Lysanders, Ansons, Spitfires, and they are now on a batch of Lincolns. Production lines of Stirlings and Sunderlands were laid down and Piper was responsible for testing over 800 Stirlings and about 100 Sunderlands.

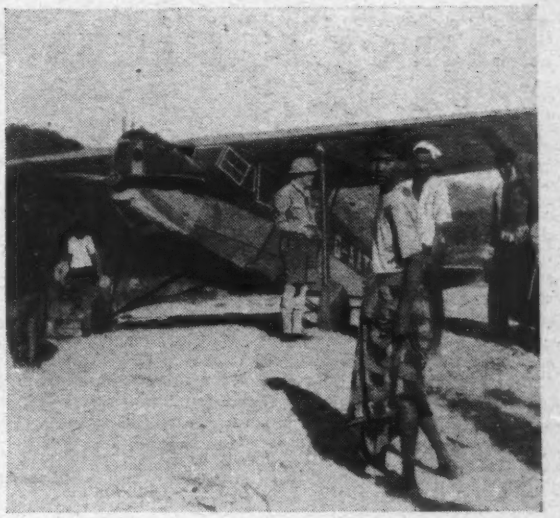
One Fine Day

In common with all the other test pilots, Pip claims to have had an uneventful career. There was one day, however, which even he admits was somewhat out of the ordinary. In the morning of this particular day there was a Stirling, a Lysander and a Battle all due for flight testing. Deciding to start with the Lysander, he got in to run up the engine and got out again when it stopped because the plugs were not fitted properly, the engine having been inhibited. Getting into the Battle next, he got to the point of starting to taxy out when the tail tyre burst. Changing over to the Stirling he got that into the air, but after a few minutes flying the supercharger impellor of the port outer engine burst, and bits flew in all directions. Flames shot from the engine cowling, but luckily no fire resulted. Arriving home on three engines he retired to lunch.

Starting again in the afternoon he tried the Battle. During the run-up the glycol temperature went up a bit high but went down again. Just after take-off, however, when he had got to some 500ft, the radiator thermometer hand suddenly went right round the clock. Piper turned away from the city and in a few seconds he could not see a thing because of a douche of scalding glycol. At the same time his flight engineer/observer, Mr. Harryman, pushed a dripping hand through from the rear cockpit to show what was happening in case Piper had not noticed it.

By this time Pip was standing on the seat, bending down to the stick and yelling at Harryman to get overboard. The rear cockpit was closed, however, and his observer heard not a word. There was nothing else for it then but to get back into the cockpit and pull off the best landing possible—a perfectly good one, dead across wind and mostly by feel, as he could only see dim outlines. All that was caused by the header tank relief valve becoming stuck; the pressure built up and the tank burst.

Curiously enough, most test pilots have had one or more aileronless flights, and Piper is no exception. On one occasion he flew a Stirling which had been standing tail to wind in half a gale. Just after take-off he hit some bumps and aileron control faded out completely. After telling the crew to stand by to jump if necessary, he found he was able to make gentle turns with the rudder only, and finished up intact after a crosswind landing. Inspection revealed that the whipping of the ailerons in the wind had broken the control pulleys.



ON THE SEASHORE: The forced landing at W. Baronga, near Akyab, which held up Piper's England-Australia flight for nearly three weeks.

An unusual "incident" was the failure in flight of a joint in the starboard flap of a Stirling. During the approach the port flap gave the necessary indication and Piper could not understand why he had to keep giving more and more port aileron to get the starboard wing up. Finally he had the wheel hard over on the stops and the wing still dropping. Only large bursts of power from the starboard outer engine saved him a perfect three-point landing on one wheel, tail and starboard wing-tip.

Apart from flying, Pip's other passions in life are duck shooting, guns and boats. He has a considerable armoury, which is the despair of his tidy-minded wife, and the boats on which he spends many hours waiting in the reeds for wily duck are built by his own hands. The pictures which adorn the walls of his house betray his devotion to these interests. Every one depicts either aircraft or wildfowl.

To date Piper has just over 4,100 hours flying to his credit and his log books show 77 different types of aircraft flown.

J. Y.

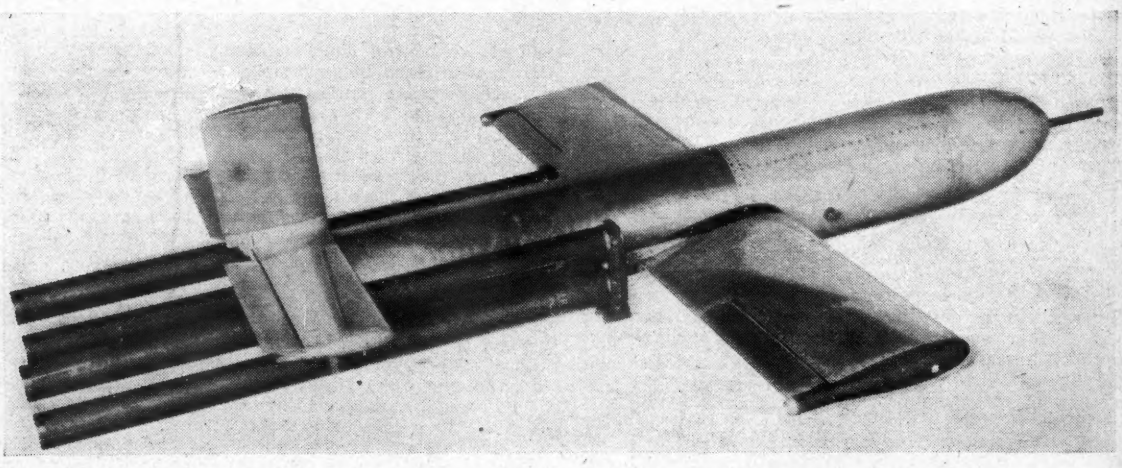
"Better get a practice homing Joe."

Fairey's First Guided Missile

Details Now Released of "Stooge" Radio-controlled Projectile

TOWARDS the close of the Pacific war the Ministry of Supply asked the Fairey Aviation Company, Ltd., to design and construct a new type of weapon as a counter-measure to the Japanese suicide bomber. The urgent need for such a weapon fortunately passed with the capitulation of Japan, when only the preliminary discussion stage had been reached, but the M.o.S. requested that work should continue on a research basis. The research section of the Fairey Company made rapid progress and within seven months of the finalization of the specification the Stooge, as it was called, had been designed, manufactured and had undergone its initial aerodynamic test flight. Over a period of eighteen months it has been developed to the stage where a controller on the ground can exercise full flight control and guide this pilotless missile through a predetermined programme of aerial manœuvres, and it may be regarded as the first British radio-controlled rocket missile.

A dramatic account of the first flight of the Stooge has been given by a technician of Fairey's research division.



The Fairey Stooge with its four take-off booster rockets in position. The span is 6ft. 10in., the length 7ft. 5½in., and the weight with warhead, 738lb. Four main rockets of 75lb. thrust each, located in the rear fuselage, give the missile a speed of over 500 m.p.h. The projection on the nose is to carry the counter balance weight for the booster rockets.

He describes how 60- and 30-second warnings were called by the firing officer while senior officers of the three Services and technicians sat around the remote-control pilot whose hands rested on the control column "projecting from a small black box on the grass in front of him." As the pilot "pressed the firing button" there was a mighty sound, reminiscent of a thunderclap, and the rush of an express train dashing into a tunnel. The little yellow aircraft seemed to be poised in space for an instant, and then, with flames roaring from its tail, it leaped forward from the ramp and began to climb away. From its wing tips, tracer fl es gushed two thin plumes of smoke. In a matter of seconds the booster rockets were jettisoned and the internal motors took over. When the missile was almost out of sight, in response to the flick of a switch an automatic safety device locked the elevators in the diving position and the Stooge plunged into the sea.

Credit for the design and construction of this successful guided missile goes to the Fairey research team, who, however, received invaluable help from the Ministry of Supply technicians. The specification is worthy of particular mention as the missile had to conform to severe limits for transportation, storage, simplicity of manufacture and rapidity of assembly for action. By the use of spigots and quick-release pins a team of four men can assemble the missile, which has an all-up weight of 738lb, in less than 1½ minutes.

The missile is of orthodox monoplane design, and the mainplane, in midwing position, is of 6ft 10in span and 17in chord There is no dihedral or sweepback, but there is a positive angle of incidence of 3 deg. On trial flights observation flares are carried at the wing tips.

The construction is extremely simple the wings having a tubular spar made in two halves which fit into one another and which carry the three cast magnesium ribs for each mainplane. A single alloy skin section is folded round this structure on each side. The spar passes through a sturdy cast centre section ring which is, in effect, the backbone of the fuselage, and to which is transferred all the thrust from the rockets.

Two monocoque sections make up a cylindrical fuselage 7ft 5½in long and 12½in in diameter. The nose is streamlined in the orthodox manner, but the tail is untapered and open-ended as it contains the venturis of the main rocket motor assembly. This rear portion of the fuselage is of mild steel but the constructional material of all other airframe members is dural, with the exception of the rectangular tail fin which is of plastic material and contains the radio aerial.

No Rudder

Similar in plan form to the mainplane, the tailplane has a span of 4ft and a chord of 10in. The elevators are conventional, but no rudder is fitted, it having been established from wind tunnel experiments that the missile could be effectively controlled with the use of ailerons and elevators only. The whole structure is stressed to withstand accelerations of 7g in turns and the Stooge has proved itself extremely manœuvrable and responsive to movement of the control surfaces.

Four standard 5-in solid fuel rockets provide the main propulsive power, the total thrust and burning time depending upon the weight of charge and size of venturi orifices. As a result of experiment an arrangement producing 40lb thrust per rocket for a burning time of 40 seconds was adopted for the later flight trials. These give a speed of 350 m.p.h.

In addition to the four main rockets, four other standard

3in A.A. pattern rockets are used to assist take-off. These are fitted externally in pairs on each side of the fuselage and project some two feet beyond the rear end of the fuselage. At the end of their burning time the booster rockets and a nose counter-balance weight (which keeps the c.'g, within permissible limits while the booster rockets are attached) are jettisoned simultaneously with the aid of small explosive charges. The total thrust derived from the booster rockets is 5,600lb, developed during a burning time of 1.6 seconds, and after only 2 seconds the speed of the missile is 267 m.p.h. Inter-connectors between the pairs of booster rockets are provided to avoid the possibility of one or more rockets failing to fire, the result of which might be an uncontrollable jawing or rolling during take-off. The final design of the inter-connectors took the form of two heavy castings serving three purposes. The two in addition to their primary purpose are first to ensure that each pair of rockets shall drop clear, nose first, at the instant of jettisoning, and, secondly, to act as shoes to ride over the rails of the projecting ramp.

A 10ft ramp of light tubular construction is used to launch the guided missile, and the elevation of the rails can be adjusted from horizontal to 45 deg by a winding screw. The Stooge leaves the ramp with an acceleration of about 8g, derived mainly from the booster rockets, and no control is exercised by the ground operator until the boosters have been jettisoned. The equipment for controlled flight is all stowed internally, the gyro being housed in the forward end of the front fuselage monocoque and the radio components, servo motors and batteries in the forward compartment of the rear monocoque. The aft section is devoted entirely to the Swallow rocket motors.

The ground equipment comprises essentially the operator's control box from which projects a "joy stick," and a transmitter unit linked to the control box which relays the initial impulses to the missile as radio signals. The time-modulated system is used to translate the radio signals into movements of the control surfaces with the aid of servo motors. In this system movement of controls depends upon the relative duration of individual tones in pairs of audio-frequencies. When the ground control column is central the tones in each pair are of equal duration, but if the stick is moved and the equality of period is disturbed, a sensitive polarized relay operates either the forward or backward contact in a servo motor and so produces a response in the appropriate control surface.

A gyro unit consisting of a "free" and "rate" gyro is also provided for the ailerons. This unit ensures that an angle of bank consistent with the position of the control column is maintained and it also looks after lateral stability up to 80 deg of bank.

Taking Over Control

After take-off and when the booster rockets have been jettisoned (this occurs one second after their total burning time, i.e., 1.7 seconds after firing) remote control of the elevators first becomes possible, and then after a further three seconds have elapsed aileron control is made available to the ground operator. This period is necessary to allow the projectile to become stable under automatic gyro control following the jettisoning of the boosters.

Before launching the missile it is necessary to warm up the radio set and to spin the gyro. This is achieved by the use of an external battery which is plugged into a socket on the starboard side of the front monocoque forward of the mainplane leading edge. This provision has the additional advantage of conserving the power of the small internal batteries. For the same reason the firing of the booster rockets, of the main propulsive rockets and of the wing-tip flares is also achieved through the exterial circuit.

Several test flights have been made and a colour film has been taken of the various launchings. The first Stooge was flown with locked controls as a preliminary aerodynamic test. After redesign of the ground starter plug to pull out rearwards, the sixth Stooge made an excellent three-mile flight during which it climbed to 1,600ft and answered extremely well to the controls. The missiles were built at Heston and the tests took place at the Rocket Experimental Establishment at Aberporth on the South Wales coast.

The missile was originally ordered for the Army, but the Naval possibilities were immediately recognized. Now in peacetime several other possible applications suggest themselves. Among these may be mentioned target work, fire-fighting (using a "warhead" of extinguishing fluid to attack, say, a burning oil well), and the carrying of lines to ships in distress. Information obtained and lessons learned from this first design have provided a stepping-off point for Fairey and M.o.S. technicians for new lines of research and development.

The Human Factor

Importance of Pilots and Navigators Stressed at G.A.P.A.N. Dinner

THERE was a very distinguished gathering last Thursday at the Connaught Rooms in London, when the Guild of Air Pilots and Air Navigators of the British Empire held their annual dinner. The toast list was a very long one, and in addition to those who spoke there were present representatives of every aspect of British aviation, Service and Civil.

LORD LONDONDERRY, Master of G.A.P.A.N., expressed the appreciation of the Guild for the honour shown it by H.R.H. Princess Elizabeth becoming its Grand Master, and recalled that this office had formerly been held by the Duke of Kent. He hoped that Princess Elizabeth would become an Elizabeth the Second. The membership of the Guild had grown, and so had the work, but thanks to the secretariat and to W/C Woodhead it had been efficiently done. He referred to the amicable relationship between G.A.P.A.N. and B.A.L.P.A. and said the organization should aim at bringing all interests together.

W/C. N. H. WOODHEAD, Deputy Master, spoke in hopeful terms of Great Britain remaining a factor in world affairs and said no section of the Empire had any intention of letting any other part sink. There were wonderful opportunities in Empire aviation, and we should view the Empire as a whole. He assured Lord Nathan of full support from the Guild.

LORD NATHAN, Minister of Civil Aviation, said the Guild and civil aviation were linked by the closest of ties. He had found some difficulty in acquiring the airmen's "patter," and when he first took office he only knew one word, "Prestwick"! But he was catching up, and he had discovered that once concerned with aviation one was "bitten by the bug." Referring to Lord Londonderry's "irrepressible insistence at Westminster" he said that but for this there might have been no civil aviation for him to preside over. Safety and regularity were the great aims, and civil aviation could not be a real success until the word "adventure" was taken out of it. No body could contribute more towards that goal than G.A.P.A.N. and B.A.L.P.A., whose advice he had come to value highly, especially in matters such as safety regulations and examinations for licences.

He wanted to make it clear that he was not concerned solely with the three corporations but equally with the charter firms, the training schools and the private flying and gliding clubs. All were essential to a healthy, developing British civil aviation. Lord Nathan expressed his gratitude to Lord Kemsley for his recent public-spirited action in establishing a fund of £100,000. He wanted the young men to feel that aviation was a career, not only while they were young but also when their flying days were over, and he had a committee working on recruiting and training schemes. He was giving his personal attention to a pension scheme.

LORD KNOLLYS said that after four years in civil aviation he had come to the conclusion that the best plea he could make was "Let us alone." Services had been opened up all over the world, and now came a time for consolidating. Give us a chance, he continued, to give better and better services as the new tools come along. The traditions built up by the Guild were of great value, and they would increase.

A. CDRE. A. V. HARVEY said Lord Nathan would not expect him to praise the Government, but he did want to place on record the courtesy and help he had always met in the Ministry of Civil Aviation. He appealed to Lord Nathan to use British aircraft whenever possible in order to gain operational experi-

(*Concluded on page 348*)

The Home of Fighter Command

Permanent Exhibition Underground at Bentley Priory

"*Flight*" photograph.

Air Vice-Marshal S. F. Vincent, C.B., D.F.C., A.F.C., Senior Air Staff Officer at Fighter Command, discusses the synthetically working G.C.I. equipment with F/O. Smith.

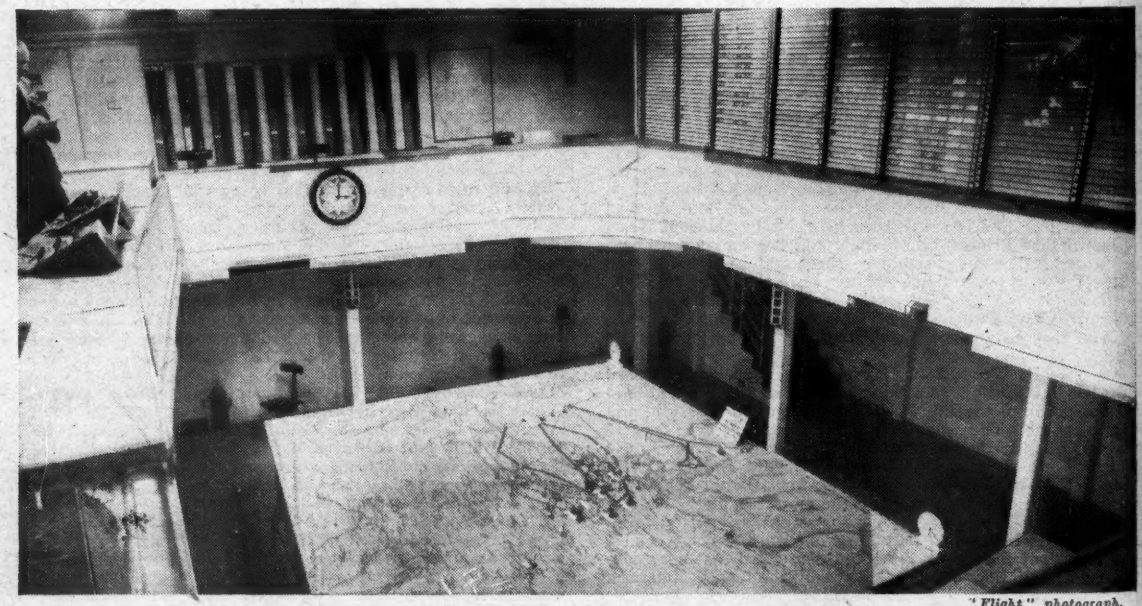
VISITORS to H.Q., Fighter Command, at Bentley Priory, Stanmore, who since 1936 have numbered many thousands and have represented several nations, will deplore the news that the ante-room—perhaps the noblest part of a beautiful home—was gutted when fire broke out on the night of March 10th. Although most of the pictures, furniture and trophies were saved, damage was suffered by the rooms above and by the roof of the East Wing, and when *Flight* visited the Priory shortly before Easter the Air Officer Commanding-in-Chief (Air Marshal Sir James M. Robb, K.B.E., C.B., D.S.O., D.F.C., A.F.C) explained to us that he had abandoned his office, adjacent to the ante-room, and was working from his caravan.

There was no evidence that the disruption caused by the fire had in any way affected the

Air Marshal Sir J. M. Robb, K.B.E., C.B., D.S.O., D.F.C., A.F.C., Air Officer Commanding-in-Chief, Fighter Command

Fighter Command hospitality. This, of course, has become a tradition, like that with which the Priory has been imbued by Pitt, Canning, Liverpool, Sidmouth, the Duke of Wellington, Lord and Lady Hamilton, Mrs. Siddons, Sir Walter Scott, William Wordsworth, Queen Adelaide and residents and guests of equal fame.

The history of Fighter Command can be traced back to the Air Defence of Great Britain, formed in 1925 under the command of Air Marshal Sir John Salmond. With the expansion of the R.A.F. in 1936, A.D.G.B. was replaced by Fighter, Bomber, Coastal and



"*Flight*" photograph.

The Fighter Command Intruder Operations Room, plotted as it would be during activity over the Continent.

THE HOME OF FIGHTER COMMAND

Training Commands, and the responsibilities of each Command were clearly defined.

With its principal commitment as the defence of London, the famous No. 11 Group was formed at Uxbridge in June, 1936. During the following month, under the command of Air Marshal Sir Hugh C. T. Dowding (now Lord Dowding of Bentley), Fighter Command was formed, with its H.Q. at Bentley Priory.

Something to See

For some years past, particularly during the war, important guests at the Priory have been able to witness for themselves the work of the famous underground Operations Room, but when this was unmanned there was little to show them to illustrate current commitments and past history of the Command. Most of the nearby Fighter airfields and radar stations had been closed or transferred, and it had become difficult to acquaint visitors with control and reporting technique.

Thus it is that a Permanent Exhibition has been established in the historic Operations Block. Here Service personnel and privileged visitors may study the work and operations of the Command.

These activities were explained to *Flight* by Air Marshal Robb and Staff Officers, including his S.A.S.O. (A. V-M S. F. Vincent, C.B., D.F.C., A.F.C.), who planned and organized the exhibition; the Command Signals Officer (A/Cdr. R. L. Phillips, C.B.E.); W/C. D. H. Grice, M.B.E., D.F.C.; and W/C. L. A. Jessop, O.B.E., D.F.C.

Disclosures by the C.-in-C. concerning his Command were reported in *Flight* last week, and it remains to record something relative to the highly creditable and instructive exhibits now available for inspection.

The old Night Intruder Room (originally the Command Filter Room) is preserved, with its plotted maps, charts, photographs and report files, to illustrate a typical night's work by intruders—actually April 4th/5th, 1945—in support of bomber operations. Precise details are given of "take-off," "on target" and "E.T.A." times, and the room must be unique in crystallizing, as it were, a few hours of war history. A picture map shows "Ranger" operations during 1944.

Nearby is the historic Fighter Command Operations Room which, as suggested by the accompanying photograph, is not large but is laid out to permit the highest degree of operational efficiency. It must be remembered that the responsibility for the defence of this country against air attack was centred in Fighter Command, supported by the Royal Observer Corps, Balloon Command, the Signals Group and units of Anti-Aircraft Command, for the operations and combined training of which "Fighter" was responsible.

It may now go on record that at the outbreak of war there were 39 operational squadrons in the Command, and that by January, 1943, this number had increased to no fewer than 102. From that date, as the resources of the Second Tactical Air Force were built up, the strength of the Command declined.

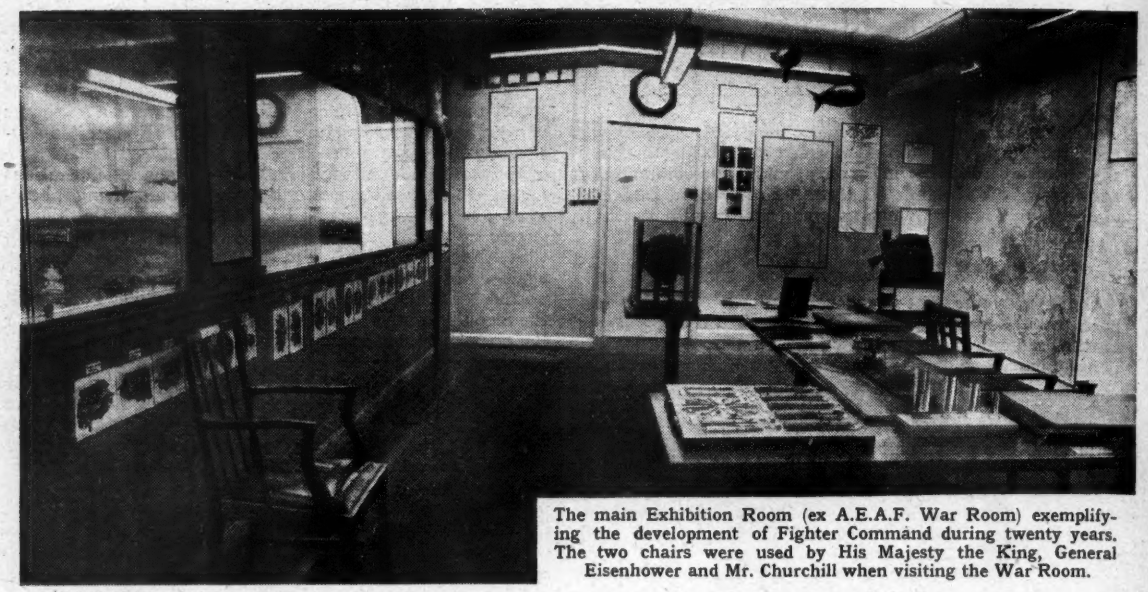
Liaison

Notices in the Operations Room state the appointments of the various Duty and Liaison officers—Service and civilian—who were kept constantly "in the picture" during air activity over or around this country. Representative plots are kept in place on the great map of the British Isles, and as all the authentic fittings, indicators, charts and other paraphernalia are still *in situ*, it is possible to give practical demonstrations of air-raid reporting and fighter control.

The history of radar has been closely linked with Fighter Command, and in the radar demonstration rooms can be seen a synthetically working G.C.I. station and a complete

"*Flight*" photograph.

A self-explanatory wall map depicting the major operations of Fighter Command during the second half of 1944.



The main Exhibition Room (ex A.E.A.F. War Room) exemplifying the development of Fighter Command during twenty years. The two chairs were used by His Majesty the King, General Eisenhower and Mr. Churchill when visiting the War Room.

"Flight" photograph.

Mark X A.1 set as fitted in the night fighter Mosquito. Also available for inspection are Gee, I.F.F., a radio altimeter and a section of a cathode-ray tube.

The W.A.A.F. Flight Officer who was demonstrating the G.C.I. equipment confessed to us that of all the visitors who have questioned her concerning the work of the apparatus, the one who came nearest to stumping her with a query was an A.T.C. cadet. Another cadet informed her that he had built a television set and wanted to know how much further he would have to go before he had radar. "That," replied the Flight Officer without flinching, "depends on the thickness of your father's wallet."

The development of A.D.G.B. and Fighter Command during the past twenty years, and the growth of Anti-Aircraft Command, Balloon Command and the Royal Observer Corps are exemplified in the main exhibition room. A particularly striking exhibit is the panorama of models illustrating the development of fighter aircraft and of airfield layout. The aircraft models range from the Gloster Grebe and Gamecock to the same company's Meteor and the de Havilland Vampire. Credit for these is due to No. 4 Maintenance Unit, Ruislip, and No. 1 Maintenance Unit, Kidbrooke. The models are correct in all details, one bearing squadron and aircraft letters of the machine used by Group Captain John Cunningham. Mr. H. E. Sheffield, the chief draughtsman at Bentley Priory, is responsible for the airfield panorama and functional diagrams.

THE HUMAN FACTOR

(*Concluded from page* 345)

ence, suggested that a brake be put on the quest for speed, and pleaded for airfield accommodation for the charter firms before next autumn.

ADMIRAL SIR JAMES SOMERVILLE, in a very amusing and witty speech, recalled that he had first flown with Geoffrey de Havilland in 1913 to test wireless reception, and with great foresight he reported that it was not worth bothering about! He had had to change his views.

When Lord Londonderry Saved the Bomber

MARSHAL OF THE ROYAL AIR FORCE SIR JOHN SALMOND recalled that when he was chief of the Air Staff Lord Londonderry was Air Minister. At Geneva an attempt was made to secure the abandonment of the bomber. Lord Londonderry fought this tooth and nail, and if he had not been successful we might have been in a sorry plight in the recent war.

G/C. W. N. CUMMING welcomed the guests, and replies were made by SIR PHILIP D'AMBRUMENILE, chairman of Lloyds, and by MR. ALAN BUTLER, chairman of de Havillands. The latter thought future navigation would be done from the ground.

SIR HENRY SELF, Permanent Secretary to the Ministry of Civil Aviation, paid a bureaucrat's tribute to the Guild. When pilots wanted something done they did it right away. Government offices worked somewhat differently, but they were doing their best and were shaping an organization that would be able to take the strain. However, this would take time.

A.V-M. D. C. T. BENNETT complained that it was unfair of the organizers of the dinner to make him tail-end Charley, but he had a confession to make: he had been *converted*. Major Mayo had persuaded him to join the Air League of the British Empire, and now he was airminded! He recalled that at last year's G.A.P.A.N. dinner he had said that Britain's future was in the air. Britain's future was still in the air, but not her aircraft. Referring to his own company (British South American Airways Corporation) he said that it had done reasonably well, at any rate it had managed to avoid having to call on the taxpayer to make good deficits. (That is more than can be said of the other two Corporations.—ED.)

Aircraft were now used for all important transport, and safety in operation was essential, but he would point out that *regulations* would never ensure safety; that depended upon the pilots and navigators, who must work hard and acquire even greater skill than they possessed at present.

PHYSICAL SOCIETY EXHIBITION

ITEMS of aeronautical interest, although somewhat difficult to dig out from among the profusion of other apparatus, were well represented at last week's exhibition of scientific instruments and apparatus, organized by the Physical Society and held at the Imperial College, South Kensington.

Representative exhibits were shown by Aldis, Bryans Aeroquipment, Cooke, Troughton and Simms, Decca Navigator, de Havilland Propellers, W. Edwards and Co., Henry Hughes, Kelvin, Bottomley and Baird, Marconi, Metropolitan-Vickers, D. Napier and Son, Negretti and Zambra, the Plessey Co., Reid and Sigrist, Sperry Gyroscope Co., Standard Telephones, and Ernest Turner.

Among the novelties may be mentioned the Vinten take-off camera, designed for recording the flight path, gliding angle, etc., of aircraft. The pictures are taken on 70-mm film, and speeds can be pre-selected to take 40, 60 or 80 frames per minute.

The Ferranti thunderstorm recorder, developed primarily to assist operators of power systems in safeguarding electricity supplies during thunderstorms, might conceivably have applications to meteorology for aircraft.

AIRFIELDS IN GREAT BRITAIN

A Review of the Past : The Present Position : Suggestions for the Future

By H. R. GILLMAN, A.F.R.Ae.S.

IN a paper presented at the annual general meeting of the Aerodrome Owners' Association, at Caxton Hall on Monday last, Mr. H. R. Gillman, secretary of the Association, made in the first place a rapid survey of past history. The experience of those municipalities, companies and private individuals who had created and operated civil aerodromes in the period between the last two wars had been, he said, of continuous toil and discouragement. At the end of the 1914-18 war the Government had launched a campaign for aerodromes and urged municipalities to undertake the responsibility of construction and share in the benefits which it was thought would result from the opening up of air routes and the development of private, club and school flying. After large sums of money had been spent in obtaining land and developing the sites, it was realized that civil flying could not stand on its own feet, and the main airline companies and flying clubs had obtained subsidy.

The aerodromes were the only section of civil aviation which did not receive any form of subsidy, although payments for the use of them by R.A.F.V.R. training schools had helped to cover some of the cost. In spite of difficulties the numbers of internal airlines increased and gradually paid their way. Clubs and schools developed, and the size of the gap between cost and revenue of aerodromes became smaller each year.

Wartime Development

At the outbreak of war the Government took the natural step of taking over all aerodromes for defence purposes, and Mr. Gillman drew attention to the fact that the initiative of municipal and private enterprise in providing the country with about fifty aerodromes had never been adequately acknowledged. Requisition rentals were paid to the owners, but naturally the progress of the aerodrome as a civil commercial enterprise came to an end. The operational needs of the R.A.F. called for great development, and vast sums of money were spent which radically altered the aerodromes from their pre-war state. When the war finished an intricate and difficult problem declared itself, for no owner, municipal or commercial, could find the money to compensate the Government for more than a small part of the wartime construction and improvement, or for the equipment which had been installed. The result was nationalization of those aerodromes required under the Government plan for internal civil airlines.

Mr. Gillman pointed out that the object of his paper was not to discuss the merits or demerits of nationalization, but to try to set out what were likely to be the future needs of civil aviation so far as aerodromes were concerned, and to make suggestions for satisfying those needs.

The attitude of those municipalities and others who had not yet owned aerodromes but who, nevertheless, were potential owners, was probably one of apathy, as they had seen what had happened to those previous owners. On the other hand, although many aerodromes had been taken by the Government, the towns and cities which had owned them would continue to benefit. In other words, they were still on the air map. Moreover, the cost would no longer be a charge on the rates but the opportunity for local influence was still there. Any municipality or other potential owner who hesitated to build an aerodrome for fear of nationalization should remember, he suggested, that the important thing was to establish an aerodrome for the locality. If, in the future, it was nationalized, it would show clearly that it had become sufficiently important, and therefore justified its creation.

Government Policy

The kind of aerodromes needed in Great Britain would be: (1) The large aerodrome for the main inter-Continental airlines; (2) the aerodrome for the main international airlines; (3) the aerodrome for feeder lines and charter aircraft; (4) the aerodrome for club and school flying and the private owner. It was the Government's policy, he said, to own and operate the aerodromes of types (1) and (2), and possibly, in a few instances, of type (3), but in practice the provision of (3) and (4) would be the responsibility of such parties as municipalities, commercial concerns and private individuals. Air transport was growing so rapidly that no city or town of any importance could afford to ignore the demand for an aerodrome in its immediate vicinity. Even now, only a year after civil flying had restarted, there were insufficient aerodromes to meet the needs of the charter companies. There were twelve seaside resorts with aerodromes, but, as he pointed out, at least five times that number were without, and the potentialities of air traffic between them and the inland towns and cities and industrial areas had not even been tapped.

Dealing next with expenses, the lecturer observed that the services of aviation, like all ventures, depended upon the demand for the facilities which it could offer. The demand, he said, would grow gradually, but it would not grow at all unless the facilities were created. He referred to the money which had been spent on roads as a means of communication and to the fact that they were not only a charge, but a means of bringing about development and a general increase in the wealth of communities by helping to increase business. The aerodrome was the equivalent of the road. The cost which would be incurred should be met by the local community, he thought, with perhaps some aid from the National Exchequer. No aerodrome could pay its way at the start, but it was significant that some pre-war aerodromes were beginning to reach the point where cost was balanced by revenue.

New Conception

The key to the future successful ownership of aerodromes, in Mr. Gillman's opinion, lay in the adoption of a new conception of what the aerodrome was to be. It should be developed in order that every piece of its area may be used to bring in some form of revenue. As an illustration he gave an account of the birth of an imaginary aerodrome, and started from the stage where a committee decided to build and develop one of medium size. He illustrated that it could be not only a centre for aviation, but also for the social life of the community, providing, in addition to a good airfield, a suitable club and flying school, hangars, workshops, waiting rooms for passengers, and all the other necessary accommodation. In addition, there would be a restaurant and bar suitable for social gatherings, with a comfortable observation place for visitors to watch flying. Other parts of the building could be planned for bedrooms, shops and stalls. Outside there could be tennis courts, a swimming pool, putting greens and a golf course.

The sources of revenue would be from landing fees, housing fees, the sale of petrol and oil, and the direct takings from the restaurant, bar and rentals. Other fees would come from visitors to enclosures, tennis courts and the other amenities. If and when a municipal aerodrome developed to the point where some or all of its services had become essential, then he thought the nation should bear the cost of providing essential flying services. This would be possible on a rental or instalment payment method, as the Government could buy more cheaply in large quantities.

REINSTATED : Vikings will be flying on B.E.A.C. Continental routes again next Monday. Mr. B. W. A. Dickson, director of Vickers and W/C M. Summers, sales manager, left England in a Mark IB last Sunday to make a demonstration tour of Australia and New Zealand.

CIVIL AVIATION NEWS

B.E.A.C.'s Operating Problems in First Winter : P.I.C.A.O. Airworthiness Division's Report

WEST COUNTRY AIR CENTRE

THE Bristol Company's export campaign and the direct attack being made on overseas markets was emphasized, on the occasion of Lord Nathan's visit to Bristol last Friday, by the arrival of the *Merchant Venturer* Wayfarer at Darwin on the same day.

Before the Minister spoke at lunch, he was challenged by Sir W. G. Verdon-Smith, chairman of the company, to disclose the methods by which he intended to obtain the results in civil aviation which everyone in this country wished to see. The future, he said, would depend largely on the decisions of the Ministry, and development in all spheres was vital to civil aviation. The Lord Mayor, Alderman G. S. James, expressed his regret at the absence of Mr. H. J. Thomas, Sheriff of the city and assistant managing director of the company, who was still unwell. He paid a tribute to the part played by Bristol aircraft during the war in all parts of the world. Mr. W. R. Verdon-Smith, proposing the toast to the city, made a plea for an early decision upon the whereabouts of Bristol's airport.

Early in his speech Lord Nathan announced the selection of Bristol as the Divisional headquarters of the Ministry of Civil Aviation for the West of England. He considered the city to be the centre of the West Country by tradition and by right. The Divisional headquarters, he explained, would consist of a Divisional Controller, with, attached to him, a representative of each of the operational and technical divisions of the Ministry, and he would be responsible for the day-to-day administration of local civil aviation. The Minister also recognized the necessity of having a first-class civil airport at a city of the importance of Bristol, and referred to Whitchurch, which had been suitable for pre-war air services, but was not now able to provide the approaches which were required for modern aircraft. He did hope, however, that it would remain the centre for private and club flying in the West, and he wished success to the Bristol and Wessex Club.

The choice of airport was between Filton and Lulsgate Bottom. He was not in a position to say categorically which would be approved, but Lulsgate Bottom had some operational advantages and appeared to be somewhat cheaper to develop. In addition, Lulsgate Bottom could probably be ready at an earlier date than Filton, as the latter would require additional runways to ensure regularity of operation.

Lord Nathan saw the Bristol 167 for the first time, and it was to that aircraft, better known perhaps as the Brabazon I, that we looked, he said, with great expectations for flying on the air routes within the next five years.

Special mention was made of the recent flight around the American continents by the Bristol Freighter, which in five months had flown 41,000 miles through twenty-five countries in just under 300 flying hours. He mentioned also the interesting feat achieved during the tour, of taking off in 37 sec carrying a 2-ton truck from the highest airfield in the world, at La Paz, 13,500ft above sea level. He congratulated Mr. Sims and the crew for their contribution to British aviation in visiting seventy-five towns and making 193 demonstration take-offs and landings without incident. That, he said, was just the sort of uneventful flying which would set aviation firmly in its rightful place as a normal commercial business, and while it was necessary to have adventure in enterprise, it was necessary to take adventure out of everyday aviation.

Lord Nathan next referred to the four-seater helicopter being developed by Bristol's and which gave promise of being the first all-British helicopter to fly on commercial services. Great things were expected of the helicopter, he said, particularly when it acquired the safety factor of two engines. B.E.A. were to begin operational trials late this summer with American machines. As British-built helicopters were available, the Corporation would be able to take them over with a background of experience on the experimental models.

A broad hint was given that the project of fitting American Constellations with Bristol Centaurus engines would be realized, and Lord Nathan referred to the pre-war Polish-operated Douglas DC-3s which had been fitted with Bristol engines and were, consequently, faster than the standard American product. He was unable to say at this stage whether the project would mature as it had to be considered in relation to the whole complex of British aviation and the country's economic structure. Brief reference was made to the faultless run of 156 hours in testing the Theseus.

THE FIRST CLEARANCE

FOURTEEN international airline companies made available their traffic accounts to the I.A.T.A. London Clearing House for January, the first month of operation. All clearance was effected by March 23rd, and £180,000 in transactions were settled for £23,000. The most extreme case was a company having credit transactions of £15,000 but whose final settlement amounted to £400. Thus, exchange costs on £29,600 were saved.

"END OF THE BEGINNING"

BRITISH European Airways, starting as they did at the end of last summer, felt the full impact of the hard winter in the task of opening up new routes and operating new aircraft, during their first half year. Mr. Anthony Milward, manager of the Continental Division in the Corporation, explained last week some of the difficulties in which they have been operating during this development period. He felt confident, however, that with the prospect of better weather and the return of the Vikings, the Corporation had passed its most difficult stage.

The servicing of aircraft had presented the greatest problem

as Northolt was the only maintenance base, and as an ex-R.A.F. station it was poorly equipped for civil purposes. They were short of hangar space, workshop, office and other accommodation, and even in the existing hangars there was no heat, and the result had been delay in servicing to such an extent that in many cases scheduled services had had to be cancelled.

As Mr. Milward observed, there were also difficulties in actual flying operations at Northolt in that the only two runways were usually out-of-wind. Ice on the tarmac had been the cause of some accidents, surface vehicles had skidded into aircraft, and it had been necessary at some periods to cease carrying passengers to aircraft in buses in view of the risk of skidding and consequent damage. The difficulties of maintenance were directly responsible for the limitations of the Corporation's activities, as naturally the number of aircraft which could be operated was entirely dependent upon adequate maintenance within a reasonable time.

The possibility of having additional workshop space was discussed, but the restrictions on building are well known, and it would be almost out of the question to make construction plans in the present circumstances. A maintenance scheme on an inter-divisional system was, however, a possibility. It was certainly in the minds of the divisional managers to organize a system for maintaining some aircraft at the English Divisional headquarters at Speke. It is the aim of the Corporation to do all maintenance work at night, and unless adequate servicing facilities are available, the services must be restricted.

In spite of all difficulties they had worked up to a crescendo at Easter when seven schedules to Paris each day were run, but Mr. Milward considered that they could have used twice as many aircraft. That, in fact, applied to most of the routes. The Vikings, as already announced in *Flight*, are due to come back on some scheduled routes next Monday, April 21st. On May 19th Vikings will be flying on the routes to Ankara, Amsterdam, Rome, Brussels, Lisbon, Athens and Geneva. Eventually they will also fly to Nice, Milan, and Oslo direct. By July or August the Continental Division will be working entirely with Vikings, and the Dakotas will be handed to the English and Scottish Divisions. In present circumstances the utilization of Vikings will be about 1,500 hours, but it is the aim to achieve about 2,000 hours' flying per year with each aircraft.

Speaking on economy Mr. Milward pointed out that the Government had insisted that certain routes should be flown for Governmental purposes. These had invariably been uneconomical, and it was the intention in the Corporation that next year the Government will be asked to make other arrangements. The withdrawal of the Vikings had created a redundant aircrew pool but that situation would straighten itself out immediately they came back into service, and it was hoped to organize the crews to fly on about six different routes for a period of six months, after which there would be a general reshuffle. This would ensure that all aircrew would become conversant with the entire B.E.A. network. Mr. Milward mentioned that the Corporation was not entirely satisfied with some of the aids to navigation and traffic control systems on the Continent, and that had the natural result of limiting operations in poor weather conditions and necessitated the carriage of a greater amount of fuel as a safety precaution than would normally be necessary, thus resulting in loss of revenue.

LORD KEMSLEY'S FUND

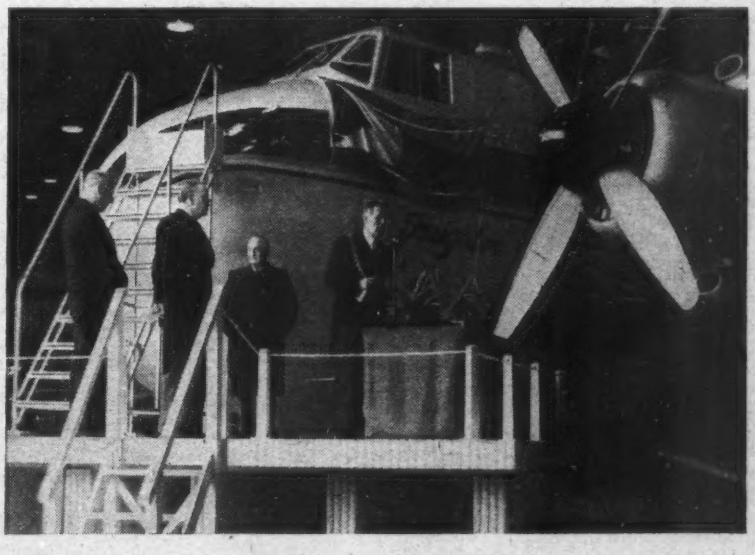
IN the belief that the future commercial air power of Great Britain depends largely upon the airmindedness of ordinary people, Viscount Kemsley has made available a fund of £100,000 for the benefit of private flying. Loans made from the fund will bear a nominal rate of interest and will be repayable over twenty-five years. The fund will be administered by a committee of the Royal Aero Club and will be dispersed to eligible organizations over a period of seven years. All spheres of private flying will benefit, including gliding. In addition Lord Kemsley has offered £1,000 in prizes to be put up at the discretion of the Royal Aero Club.

AIRWORTHINESS DISCUSSIONS

THE Airworthiness Division of P.I.C.A.O. completed its second session on March 15th after three weeks of discussions. Sir Frederick Handley Page, vice-chairman of the Air Registration Board, led the British delegation and Mr. W. Tye was his deputy. The party included members of the staff of the A.R.B., the Ministries of Civil Aviation and Supply, and observers from the S.B.A.C. Mr. K. T. Spencer, of the Ministry of Supply, was elected chairman of the Division, and members of the British delegation were appointed to the chair of five of the seven main sub-committees.

Discussion centred around the amendment to the requirements for transport category "A" aircraft, which was prepared at the previous session in 1946, since a year's experience of their use had revealed a number of weaknesses. The U.K. was apparently in a rather better position than other members, as no other country had advanced far in the incorporation of P.I.C.A.O. standards in its national requirements, whereas the A.R.B. had, by November of last year, introduced the majority of them into the British Civil Airworthiness Requirements. Preparatory discussions were held on other airworthiness categories. Agreement was reached on certain matters of principle, the most important being that as far as possible there should be only one acceptable minimum level of safety for the carriage of fare-paying passengers, whether on scheduled or non-scheduled flights. While accepting the level of safety implied by the Airworthiness Requirements for transport category "A," together with the associated operating regulations, as an acceptable minimum standard, the possibility of establishing other categories was discussed.

It was agreed tentatively that two additional categories were desirable for international commercial passenger use. The first of these would have the same en route performance with one engine inoperative as the present category "A," but would not necessarily be capable of taking off if one engine should fail during take-off. This category would, therefore, provide for multi-engined types with rather less power than in the case of category "A" types. The second additional category would not provide performance margins after one engine failed either during take-off or en route. This category would, therefore, cover single-engined and low-powered multi-engined aircraft. In both cases the view was taken that since forced landing would be a likely result of engine failure, some measure of "crashability" should be provided. This would mean that, among other things, a limitation on the stalling speed would be necessary to minimize the consequences of forced landing. Although it was not discussed by the Airworthiness Division, it was expected that aircraft in such categories might be restricted in operation, particularly in connection with the nature



"MERCHANT VENTURER": The Lord Mayor of Bristol so christened a Bristol Freighter before it left on March 22nd for a demonstration tour of Australia. In the photograph, from left to right, are: Capt. K. J. G. Bartlett, sales director; Mr. H. J. Thomas, Sheriff of Bristol and assistant managing director of the Bristol company; Sir Stanley White, managing director, and the Lord Mayor, Alderman G. S. James.

CIVIL AVIATION NEWS

of routes, and weather conditions in which flying was permitted.

A much simplified form of Certificate of Airworthiness was also agreed. The I.C.A.N. form at present used in the U.K. includes some of the airworthiness limitations. With the increasing complexity of large aircraft, however, it is no longer possible to include all such information on a small certificate, and the view was taken that it should appear in an aircraft flight manual, making the Certificate of Airworthiness quite simply a certificate.

The actual volume of work achieved by the 1947 conference was apparently less than that achieved at the first conference in 1946. However, it is only to be expected that as the number of international standards increases, more time must be devoted to the amendment and revision of existing material and less to the preparation of new requirements.

BABY PUSHER: The Aristocraft four-seater built by the Waco Company has completed its first test flights. The estimated range is over 600 miles at a cruising speed of 135 m.p.h. The front wheel is steerable and all three wheels are retractable and designed to permit damage-free landings, even when retracted.

BREVITIES

The Indian National Airways' service between Delhi and Lucknow has been suspended until further notice, but the daily Dakota service from Delhi to Calcutta now calls at Lucknow in each direction.

* * *

Trans-Canada Air Lines have placed an order with Canadair for twenty DC-4M North Stars. The first North Star to fly a scheduled service was due to arrive at London Airport yesterday, and regular North Atlantic services will start immediately.

* * *

Two Falcon aircraft left Prague on April 1st for the tour of South Africa mentioned in *Flight* of March 20th. It is not known why the third did not leave, but we understand that the hold-up of the other two was due to delay in receiving some of the essential permits and visas. The first of these aircraft for delivery to a private owner is now in this country.

* * *

Mr. G. W. G. McConachie has been appointed president and chief executive officer of Canadian Pacific Airlines. Mr. Carl Niderost has been appointed assistant secretary of the Canadian Pacific Railway. He will also be secretary of Canadian Pacific Steamships and Canadian Pacific Airlines.

* * *

K.L.M. have ordered a further two Constellations. These aircraft will be used to augment the present schedules across the North Atlantic, and will bring the total number of K.L.M. Constellations to thirteen.

* * *

A.O.A. have received permission from Norway to operate over Norwegian territory until the end of 1951. The trans-Atlantic service will be extended to Helsinki in May.

* * *

The B.O.A.C. York *Marlow* when flying from Cairo to Malta recently developed engine trouble. Capt. A. C. Bray turned back and flew to the nearest occupied airfield, which was the R.A.F. Station at El Adem. Passengers were transferred to other aircraft and flown on to the U.K., and the York was flown back to Cairo after engine repairs had been completed.

* * *

The Ministry of Civil Aviation hope that it will soon be possible to adjust the present Licence examination arrangements in order to suit the convenience of applicants in the provinces. It may be assumed that candidates will be able to sit for examinations in centres other than London.

* * *

Preliminary steps for the establishment of a South Pacific air route between Sydney and Santiago were taken when the Chilean Minister to Australia, representing Chile at the recent P.I.C.A.O. conference, formally introduced the question before the Air Routes Committee. Further information and technical details are being collected for submission to the Committee.

The Canadian Air Transport Board, during the latter part of February, issued non-scheduled charter service and flying training licences to fourteen Canadian companies operating in various parts of the Dominion. One company is based at Aklavik, two hundred miles north of the Arctic Circle.

* * *

The first Viking for Air India recently came off the production line at Weybridge and will soon be delivered for trial and training flights on the company's routes. Delivery of the complete order of six will be made this year, and it will enable the company to extend services which at present operate through Karachi, Bombay, Colombo, Delhi and Calcutta.

* * *

London Aero and Motor Services' commercial and charter section has moved from Stansted Airport to Bassishaw House, Basinghall Street, London, E.C.2. The operational side of the company naturally will remain at Stansted. As a pure air cargo-carrying company L.A.M.S. have chosen the City in preference to the West End.

* * *

A Spanish military mission is visiting aircraft factories in this country. On April 3rd the visitors, accompanied by Col. Sartorius, the Spanish Air Attaché, were conducted round the Percival works. They were able to see the prototype Merganser, and the Prentice on the production line. Considerable interest was shown in the Prince, the latest Percival transport.

* * *

For the year ending June 30th, 1946, road fatalities in Australia were 1,078 and the number of injured totalled 17,015. During the same period 179 were killed and 2,872 were injured in railway accidents. Australian airlines had one accident, which killed 21 passengers. The number of passengers carried on airlines during the period was 525,025.

* * *

Mr. Lindgren, in reply to a question in the House of Commons, said that the estimated annual cost of operating and maintaining a Tudor III aircraft for ministerial use should be about £160,000, including depreciation of £50,000 and allowances for insurance and interest on capital. He estimated that the cost involved in chartering current types of four-engined aircraft on the same scale of foreseeable utilization of the Tudor IIIs would be at least £190,000.

* * *

Air Transport (Charter) Channel Islands took delivery on April 2nd of their first Douglas C.47 conversion, which has been completed by Scottish Aviation. The aircraft is licensed for freight and passenger carrying and is the first of a fleet which will comprise, initially, two Dakotas and two Rapides. The company intend to operate passenger and freight charter services to European countries, the Middle East and South Africa, and this first aircraft will go into service immediately.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

THE BATTLE OF BRITAIN
Number of Casualties

YOUR correspondent Mr. F. J. Seward asks how the inclusion of 1,500 names in the Roll of Honour to be placed in the Abbey when the King unveils the Memorial Chapel on July 10 can be reconciled with the figure of 375 published in 1941.

The Roll of Honour includes:—

448 in Fighter Command.
718 in Bomber Command.
280 in Coastal Command.
14 in Other R.A.F. Commands.
34 in The Fleet Air Arm.

Those killed in other than Fighter Command are included in the Roll because their attacks on enemy shipping, invasion barges and bases of various kinds were an essential contribution to the winning of the Battle, which is deemed to have begun on July 10 and ended on October 31, 1940.

E. H. KEELING,
Hon. Sec., Battle of Britain Memorial.

AIR MINISTRY AND A.T.C.
Reduced Recruit Training

From: Air Chief Marshal Sir Philip Joubert de la Ferte, K.C.B., C.M.G., D.S.O.

WITH reference to "Adjutant's" letter published in your paper on March 13th, and to Mr. Cochrane's previous letter published on February 6th, I have to inform you that after further detailed inquiries, which were very prolonged owing to the anonymity of "Adjutant" and our inability to obtain information that would have been of assistance to us, it appears that the complaint made in "Adjutant's" letter is well founded. Mr. Cochrane's letter was written in good faith and was based on the information available at the time.

This information was to the effect that orders had been issued by Technical Training Command that A.T.C. cadets who possessed a proficiency certificate were to receive certain advantages during their recruit training as from January 1st, 1947. Unfortunately, in the case of the cadet referred to by "Adjutant," these orders were not put into effect.

We are grateful to your journal for calling attention to an administrative weakness which, I am assured, has now been eliminated.

P. B. JOUBERT.

PRIVATE FLYING
The Need for a Resolution

AS one who has always been interested in the development of aviation—especially private flying in this country—may I utilize a little of your valuable space to bring to the notice of your readers extracts from a leading article which appeared in your Canadian Contemporary, "Aircraft and Airport Construction, Maintenance, Operation," in January of this year.

It refers to a resolution recently passed by the Aviation Distributors and Manufacturers' Association in the United States. It was a resolution addressed to their Government, setting out as they saw it a case for flying.

To my mind, something of the same nature in this country, agreed upon by every private owner of an aircraft, every commercial aircraft operator, every aircraft manufacturer and every manufacturer of ancillary equipment connected with aviation, would perhaps help in taking us out of the lethargic frame of mind which, since the war, seems so prevalent when it comes to considering private and sporting flying, etc.

I therefore, with your permission, give below certain extracts of the resolution—modified slightly to suit our circumstances.

"WHEREAS the future of the aviation industry depends largely upon the creation of an air-minded public, and

"WHEREAS the maximum participation of the public in aviation will be possible only through the building of thousands of additional small airfields conveniently located throughout the country so that the greatest business and recreational use of private aircraft may be obtained, and

"WHEREAS the defence of our country in any future war would be largely dependent upon the size and ability of our Air Force, it would be tremendously aided by the reservoir of private pilots who would be available immediately, and

"WHEREAS the aircraft industry is in the same position as the motor car industry in that roads were constructed through Government funds to spur the motor car industry, and now aircraft need small convenient airfields, and

"WHEREAS the benefits of such a programme will be reflected in vastly increased employment in all parts of the industry through the greater desire on the part of the public to use aircraft for business and pleasure, be it therefore

"RESOLVED by the Association that we urge the Government to do its utmost in the appropriation and distribution of assistance to encourage and foster the private flying industry through aid to local interests, which could plan small airfields because of the importance to the country's future defence and because of the thousands of new jobs in the aviation industry which would be created."

The above, Sir, is how another country sees it. Would it help in this country?—or would it?

GEORGE GOODHEW, Director.
Goodhew Aviation Co., Ltd.

BADGES AND CRESTS
Help Wanted for Collection

IN memory of the years gone by, when the Allied Air Forces were fighting together for the common cause, I have started a collection of Air Force badges such as squadron crests, all air-crew wings, Air Force buttons of various nations and cap-badges, etc.

I hope some of the readers will be able to assist me by sending any badges they can spare. Badges and insignia of ex-enemy Air Forces would also be appreciated. I am in possession of a number of duplicates and will exchange them if anyone is interested.

F/L. A. J. G-N.

8, College Terrace, Brighton, Sussex.

NAVIGATION LICENCES
New Concessions Criticized

THE remarks contained in your notes (April 3rd issue) about Navigation Licences evoked considerable amusement among air navigators in general.

As a navigation instructor who has spent a considerable time endeavouring to instil some slight knowledge of the art into these same pilots, whom you deliciously and aptly describe as "experiencing difficulty in expressing themselves on paper and producing a given amount of work within a strict time limit," I feel that the reported concessions in their favour are not only unjustifiable but positively dangerous.

At a time when flying has an appalling accident reputation to live down, the suggestion that a number of partially illiterate "George minders" should be licensed and encouraged to practise, what are naively referred to as "their own navigation methods," is both foolhardy and may prove suicidal to the firm establishment of air transport in public favour.

The belief that after 7,000 hours in the pilot's seat, plus a short elementary test, a man suddenly becomes a first-class navigator is surely as patent a peril and absurdity as would be the plea of a first-class navigator, that after 7,000 hours as navigator, he was entitled to a "B" licence. However, whereas the one absurdity is a fact, the other would be laughed out of court by the pilot-controlled aviation world.

GORDON DAVIDSON, B.A. (Oxon),
First-class Air Navigator.

FORTHCOMING EVENTS

April 17th.—Royal Aeronautical Soc. "Testing Civil Aircraft." P. A Hufton, M.Sc.
April 18th to 21st.—Aero Club of Spain. Madrid Air Rally.
April 24th.—Royal Aeronautical Soc.: "The Risk of Fire, and Fire Prevention Methods," Dr. I. Drinkwater, B.Sc., D. Phil., and W. G Glendening.
May 3rd.—Yorkshire Aeroplane Club: Flying Meeting, Sherburn-in-Elmet.
May 3rd.—British Interplanetary Soc.: "Nature and Distribution of Meteors."
May 7th.—Royal Aeronautical Soc. Discussion on Naval Aircraft. 11 a.m.—6.30 p.m. Paper:—"Aircraft Design," W. S. Farren: "Equipment," L. Boddington. "Operational Flying," Cdr. F M A Torrens-Spence; and a deck landing film by W G A. Perring.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

HELICOPTER HAVEN: A pontoon-equipped Sikorsky helicopter is launched at Portland by the Royal Naval Helicopter Training Detachment. A later Sikorsky type is to be built by Westland Aircraft Ltd. "Whirlpool" is suggested as a suitable name for a navalized version.

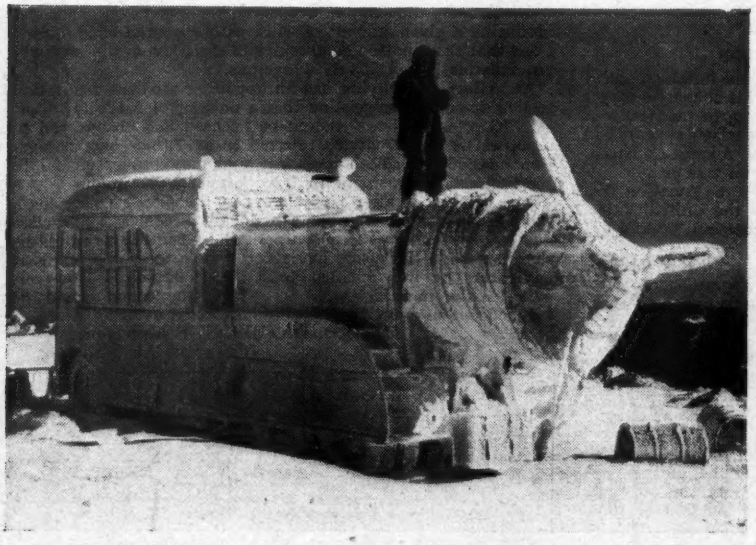
Important Presentations

YESTERDAY (April 16th) two presentations of benefit to serving and former members of the R.A.F. were made at the Hall of the Auctioneers' and Estate Agents' Institute in Lincolns' Inn Fields. Both gifts have been made from the R.A.F. Pilots' and Crews' Fund of the Institute.

On behalf of the Royal Air Force Benevolent Fund, Her Royal Highness the Duchess of Kent accepted a cheque for £50,000, completing a gift of £200,000, and the Secretary of State for Air, the Right Honourable Philip Noel-Baker, M.P., was presented with the title deeds of Headley Court, Leatherhead, for use as a rehabilitation centre for flying personnel of the Royal Air Force, and a donation of £133,000 for the equipment of the centre.

Amounts contributed in various parts of the country are:

London	£27,137
Beds, Herts and Hunts	£4,277
Belfast and Northern Ireland	£11,510
Berks, Bucks and Oxon	£9,100
Birmingham and West Midlands (Warwick, Worcester and the counties of Hereford; Stafford, except the town of Burton-on-Trent; Salop, except that part lying north-west of the Cambrian Railway (G.W.R.)	£63,219
Bristol and District	£10,216
East Anglia	£15,987
Hants, Wilts and Dorset	£30,285
Kent	£31,990
Lincolnshire	£24,375
Liverpool and Distict and North Wales	£13,957
Manchester and District	£10,177
Midland Counties (Covers the Counties of Leicester, Nottingham, Derby, Rutland and Northampton, and Burton-on-Trent)	£36,032
Northumberland and Durham	£7,117
South Wales and Monmouthshire	£2,296
Surrey	£8,458
Sussex	£11,737
Western Counties	£17,823
Yorkshire	£11,540



WITH RIME AND REASON: In view of the recent trials with the Viking and R.A.F. and R.C.A.F. experiments in Canada, this view of a 20-ton tractor, mounting a 2,200 h.p. engine for icing research, is of special interest. It is stationed on the 6,288ft Mount Washington, New Hampshire.

Spitfires for S.A.A.F.

SPITFIRE IX fighters—136 of them—are being transferred from the R.A.F. to the South African Air Force. It is planned to ferry ten a month between now and May, fifteen a month from June to October and sixteen in November, subject to delivery of aircraft and availability of pilots. Pilots of No. 46 Group of Transport Command will ferry the aircraft from Pershore.

Mobile Classrooms

DESIGNED to allow Technical Training Command to give instruction on new and special equipment, instead of sending maintenance personnel and aircrews on special courses, the latest type of mobile classroom is a large articulated trailer, 26ft long, and fitted out as a schoolroom or instructional workshop. Some classrooms have a 16 mm cinematograph projector which can show talking instructional films dealing with the type of equipment with which the classroom is concerned. Others have a synchrophone which gives instruction by means of an electric gramophone synchronized with an illuminated screen.

The crew of each classroom is one instructor and one driver. The instructor will, in most cases, have been trained by the manufacturer of the equipment it is his duty to explain. Each trailer has an electric lead 100 yards long so that electric power and light may be drawn from nearby sources.

The equipment varies from motor tyres to jet propulsion engines; from adhesives to flying instruments. There are now 43 mobile classrooms available for use in any part of the world.

Ceylon Inspection

AIR Marshal Sir George Pirie, Air C.-in-C. South-East Asia, arrived at Negombo, Ceylon, recently for a seven-day inspection of the island's airfields. On the same day Air Marshal Sir

Badge of the School of Army Co-operation. R.A.F. "Disce Aut Descende." (Learn or come down.)

Badge of No. 2 Armoured Car Company. R.A.F. "Nunquam non Paratus." (Never Unprepared).

Badge of No. 100 Torpedo Bomber Squadron. "Sarang Tebuan Jangan Dijolok." (Never Stir up a Hornet's Nest).

Badge of No. 651 Squadron R.A.F. "Dirige." (Direct). A seashell fired like an R.A. grenade.

Badge of No. 250 Sqn. R.A.F. "Close to the Sun." The river eagle is a bird indigenous of the Sudan.

Roderic Hill left Ceylon for Karachi on his way home to England after his tour of R.A.F. establishments from Malta to Hong Kong.

Staffordshire Appointment

AIR COMMODORE JOHN OLIVER, A.F.C., has been advised by the Air Council that he has been appointed as a selected Air Force member of the Territorial and Auxiliary Forces of Staffordshire.

A test pilot and instructor of repute, with 30 years' R.A.F. service behind him, A.Cdre. Oliver last year joined the Aviation Products Division of the Goodyear Tyre and Rubber Co., Ltd.

Ex-Minesweepers for Coastal Command

THE R.A.F. have taken over two minesweepers from the Royal Navy—the *Bridport* and the *Bridlington*—which have been refitted for service with Coastal Command. They will be the first large ships to be operated by the Service. The vessels will each have a complement of about 40 and will be used as depot ships for marine craft in connection with aircraft torpedo recovery.

No. 42 Air School Association

MR. G. L. HINDLEY, secretary of the U.K. Branch of the 42 Air School (Port Elizabeth) Post-War Association since its formation, is returning to South Africa in May. He is succeeded by Mr. W. C. Pettitt, of 24, Ellerman Avenue, Whitton, Twickenham, Middlesex, to whom all correspondence should be addressed.

R.A.A.F. Helicopter Training

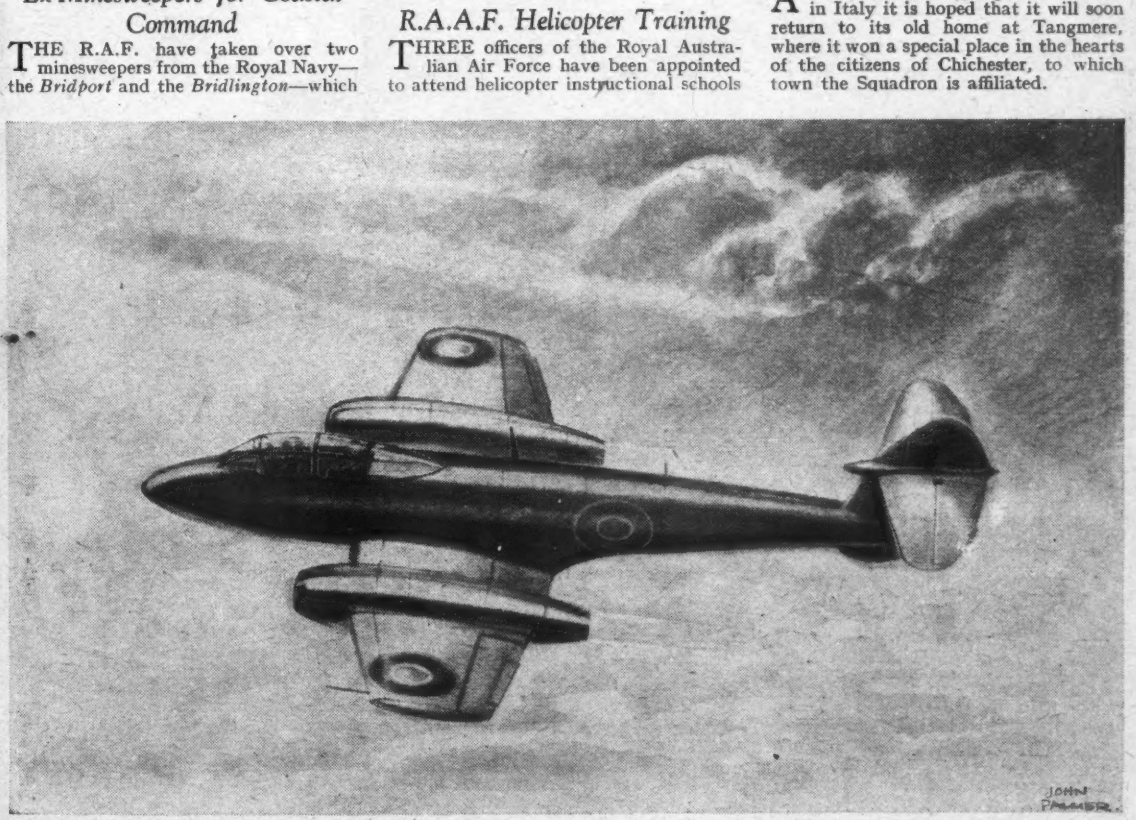
THREE officers of the Royal Australian Air Force have been appointed to attend helicopter instructional schools abroad. One is S/L. K. V. Robertson, A.F.C., who received his decoration for work on an anti-g suit and who is at present in this country attending the Empire Test Pilots' School. It is also announced that the R.A.A.F. has purchased a Sikorsky S-51.

Revision of Ordnance Maps

RESULTING from surveys by R.A.F. aircraft Ordnance Survey maps of the British Isles are to be drastically revised.

43 Squadron for Tangmere Again?

ALTHOUGH No. 43 Squadron is still in Italy it is hoped that it will soon return to its old home at Tangmere, where it won a special place in the hearts of the citizens of Chichester, to which town the Squadron is affiliated.



TWO UP: A *Flight* copyright sketch of the new Gloster Meteor Trainer, developed from the Mark IV fighter. Details were published last week.

SERVICE AVIATION

R.A.F. Movements—Unit Badge

FOLLOWING a contest open to all members of R.A.F. Movement Units, two designs for a badge are to be submitted for approval to the Inspector of R.A.F. Badges (Chester Herald). The two designs have been made up from ideas incorporated in winning entries chosen by a committee under A. Cdre. H. D. Jackman, C.B., C.B.E., Director of Movements, Air Ministry.

Benevolent Fund Controller Retires

AIR VICE-MARSHAL SIR HAZELTON NICHOLL, K.B.E., C.B., retired from the post of Controller of the R.A.F. Benevolent Fund on March 31. He will be succeeded by Air Vice-Marshal Sir John Cordingley, K.C.B., C.B.E.

Air Vice-Marshal Nicholl became Controller in October, 1944. During the period he has been with the Fund over 72,000 officers, airmen and their dependants have received assistance, over £976,000 being expended in grants and loans. He became a bomber pilot in 1915 and played an important part in the Battle of Britain, when he was in charge of Administration at Fighter Command.

Air Vice-Marshal Cordingley enlisted in the R.N.V.R. in 1905. He recently retired from the post of Director-General of Manning at the Air Ministry.

Saved in Sixteen Days

A LARGE-SCALE rice-dropping operation, known as "Operation Hunger 4", to relieve the Karens of threatened starvation has been completed well under the estimated time—in sixteen days.

R.A.F. aircraft of Nos. 48, 52 and 110 Squadrons took off from Mingaladon at dawn each day, and flew to an advanced airstrip at Toungoo, where rice and salt was ready for loading. Thence Dakotas made sorties over dangerous hills to the north-east of Toungoo to selected dropping zones, where the Karens waited. On good days as many as eight sorties were possible; more would have been flown, but, due to excessive turbulence in the dropping zones in the late afternoon, operations became too dangerous and had to cease.

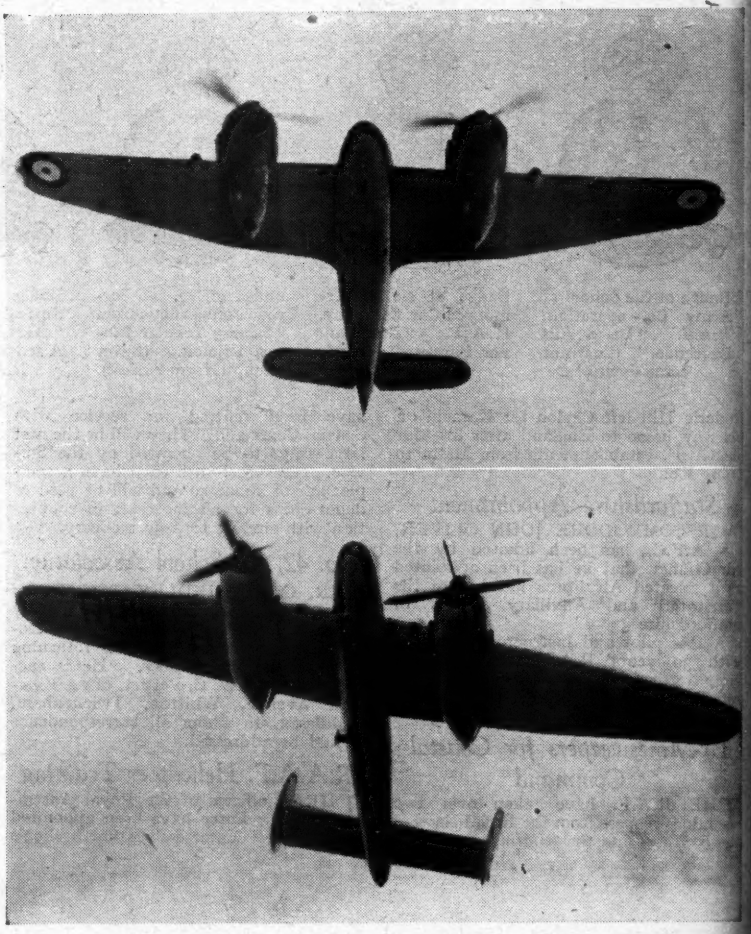
To express their appreciation of the help given them by the R.A.F., the local Karen Youth Organization have given a dinner and leading Karen citizens a luncheon, attended by the A.O.C., Burma, A.V-M. A. C. Sanderson.

R.A.F. Nursing Service

THE future of Princess Mary's Royal Air Force Nursing Service, in which the Princess Royal, as President, takes a keen interest, is being considered. Peacetime strength of the Service will depend upon the size of the R.A.F. and the number of hospitals to be retained permanently.

From a pre-war establishment of some 227 Sisters, the numbers rose to over 1,200 as the "P.M.s" were called upon to meet increasing demands wherever the R.A.F. was serving. Air Force Sisters travelled in troopships, including the *Queen Elizabeth*, to attend British and American wounded. With their army comrades of the Q.A.M.N.S., they were the first British women to land on the Continent after D-day, and in mobile hospitals were often under fire.

The Matron-in-Chief, Miss G. Taylor, C.B.E., R.R.C. (she holds the equivalent rank of Air Commodore) joined the P.M.s in 1918.



COASTAL BRISTOLS: Units of Coastal Command and of the R.A.F. overseas now armed with Beaufighters (top) will re-equip this year with Brigands, as shown in the lower view. Officially classed as a "torpedo-fighter," the Brigand has Centaurus engines using water-methanol injection for take-off.

Ready Response

WITHIN four days of appealing for accounts of Service experiences, to lend colour to the official history of the air war, the Air Ministry received over 150 replies, ranging from short letters to a 223-page typescript. Every letter is being personally answered and all documents will be returned. Accounts should be addressed to the Air Historical Branch, Air Ministry, Whitehall.

R.A.F. Police Training

AT their school at Staverton, Gloucestershire, R.A.F. police recruits are taught everything from defence against knife or bottle attacks to court martial procedure and the handling of Alsatian police dogs bred in the school's own kennels. Pupils hold mock courts martial and attend trials by subordinate commanders and civil police courts in Cheltenham and Gloucester. They are also enabled to take part in local check-ups with the R.A.F. police. Included in the instructional exhibits are samples of every pass in use (including fakes).

R.A.F. and W.A.A.F. are trained to cover the whole range of police duties—security, anti-vice work, crime detection, traffic control and court duties.

It has just been announced that the administrative control of the R.A.F. police will shortly be taken over by R.A.F. Reserve Command from Technical Training Command. Operational control will still be exercised by the Provost Marshal at the Air Ministry.

Reunions

IN view of the success of a 230 Squadron reunion held on March 29th it is proposed to arrange a similar gathering (all ranks) for next winter. Those whose addresses are not already recorded should send them to F. T. Ward, 21, Chevening Road, Upper Norwood, S.E.19.

It is hoped that the second annual reunion dinner of the 43 Squadron, R.A.F. (Fighting Cocks) Association, will take place about March next year. Details may be had from the Hon. Secretary, 16a, Garlinge Road, London, N.W.2.

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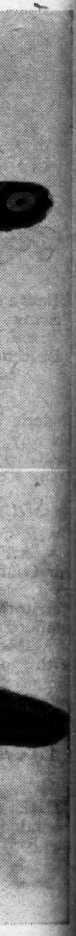

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